

EARTH, WIND, FLU, FLOOD, AND FIRE: EARLY
EVOLUTION OF U.S. NATIONAL POLICY
FOR NATURAL DISASTER RESPONSE

A thesis presented to the Faculty of the U.S. Army
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by

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ABSTRACT

EARTH, WIND, FLU, FLOOD, AND FIRE: EARLY EVOLUTION OF U.S. NATIONAL POLICY FOR NATURAL DISASTER RESPONSE, by MAJ Terrence J. Alvarez, 161 pages.

The beginning of the 20th century marked a departure point for the United States (U.S.) in several ways. Technological and scientific advances that would continue to influence the U.S. for decades occurred with seeming regularity. For the citizens of the U.S. and its leaders, this was an era of tremendous confidence in science, technology, and medicine. Storms could be predicted, diseases defeated, and structures built so they could withstand the worst of the earth's ravages. Or so they thought. Despite their confidence, or folly, the early 1900s brought about unparalleled destruction and death from natural disasters. The 1900 Galveston Hurricane and the San Francisco earthquake of 1906 leveled both cities. The Galveston disaster remains the largest casualty-producing storm in American history. An influenza pandemic, known as the "Spanish Flu," emerged in 1918 and killed more humans than any event in recorded history. American casualties would be between 550,000 and 675,000 and worldwide over 100 million most likely died. In 1927, the "levees only" policy along the Mississippi River failed, inundating 16,500,000 acres across seven states with up to 30 feet of water. During these events, governments, were overwhelmed all levels, technologies crumbled, and science stood by powerless.

These events remain relevant today. They highlight the evolution of national response policy for major natural disasters from a laissez faire approach to a more progressive attitude. They also introduce lessons that should be incorporated in current response doctrine. Examples include the importance of preparedness at all levels, the responsibility of the press and leaders regarding information management, and the need for the military to include Defense Support to Civil Authorities (DSCA) in officer development.

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ACRONYMS

AAR	After Action Review
ARDS	Acute Respiratory Distress Syndrome
BG	Brigadier General
CAC	Colored Advisory Committee
CPT	Captain
COL	Colonel
DHS	Department of Homeland Security
DNA	Deoxyribonucleic Acid
DOD	Department of Defense
DSCA	Defense Support of Civil Authorities
FEMA	Federal Emergency Management Agency
FM	Field Manual
MG	Major General
MRC	Mississippi River Commission
NGO	Non-Governmental Organizations
NRF	National Response Framework
NRP	National Response Plan
PCA	Posse Comitatus Act
RNA	Ribonucleic Acid
USACE	U.S. Army Corps of Engineers

CHAPTER 1

INTRODUCTION

Introduction/Background

The dawn of the 20th century signified a major transition for the United States (U.S.) regarding its government's policies for responding to natural disasters. While most of the 19th century was certainly an era of economic, technological, and demographic growth, it was still a relatively simple time. The technological, medical, and scientific breakthroughs developed in the late 19th and early 20th centuries greatly improved peoples' quality of life as well as communication and transportation capabilities throughout the nation. For example, while in 1895 there were less than 300 registered cars in the U.S., that figure grew to 78,000 in just 10 years and by millions within 100 years.¹ The advancements of this era redefined how Americans lived their lives, and changed their expectations of the federal government.

Technological and scientific advances that would influence the U.S. for decades occurred with seeming regularity. This was the era when Orville and Wilbur Wright introduced the airplane. Perhaps lesser known, but of equal importance, was the development of organizational efficiencies such as mass production factory lines, the genesis of motion pictures, and tremendous advances in engineering that produced the diesel engine and massive skyscrapers.² The most amazing engineering accomplishment of the time, the Panama Canal, built by American engineers, linked the Atlantic and the Pacific Oceans.³ Additionally, Albert Einstein, while working in a Swiss Patent Office, introduced the theory of relativity to the world in 1905, thereby initiating the theoretical beginnings of the nuclear age.⁴

Medical advances in the U.S. during the late 19th and early 20th century were equally impressive. The Johns Hopkins School of Medicine, destined to become one of Americans preeminent medical institutions, opened in 1893. Chemistry, microbiology, laboratory science, and an understanding of the relationship between germs and disease, known as germ theory, all developed rapidly. These advances led to improvements in surgery, treatment of disease, and life expectancy. Another significant breakthrough was in the area of immunization. While the concept that science could actually prevent and cure many diseases was considered impossible during the Civil War, by 1900, scientists had developed immunizations for cholera, diphtheria, anthrax, and rabies.⁵

Experts boasted that humans were no longer subject to the will of nature or to the acts of a “vengeful God,” but actually capable of controlling these forces. There was even a discussion on how to control the weather. Meteorologists debated whether hail could be subdued with cannon fire or if starting large fires would bring about rain.⁶ Thus, for the citizens of the U.S. and its leaders, this was an era of unparalleled confidence in science, technology, and medicine. Scientists could predict storms, identify and defeat diseases, and erect structures that could withstand the worst of Mother Nature’s ravages.

The medical, scientific and technological breakthroughs of the time are consistent with the greater social movement that occurred between 1890 and 1920 known as the Progressive Era. Along with profound confidence in the advances brought about by the industrial revolution, Progressives advocated political and economic reform to improve the quality of life of all Americans, particularly those in the lower classes. They focused reforms specifically on urban politics where grafts, corruption, and inefficient officials dominated local governments. The movement to improve government capabilities and

services greatly influenced local, state, and federal policies for responding to the natural disasters.⁷

Although the Progressive Era is most remembered for its advancements, it was also marred by unparalleled destruction and death from natural disasters. The 1900 Galveston Hurricane and the San Francisco earthquake of 1906 leveled both cities. The Galveston tempest remains the largest casualty-producing storm in American history. In 1918, a worldwide influenza pandemic, known as the “Spanish Flu” killed more humans than any event in recorded history. American casualties totaled between 550,000 and 675,000. Worldwide, up to 100 million people died.⁸ Additionally, when the Mississippi River flooded its banks and levees in 1927, it inundated 26,000 square miles with water, and stranded 330,000 people.⁹ During these four catastrophic events, local, state, and national governments were ultimately unprepared and unable to prevent these catastrophes. Moreover, their responses proved woefully inadequate in context of the expectations of the Progressive Era given the great loss of life and property.

These events ultimately convinced America’s leaders that the federal government needed to be more involved following or during major disasters and marked a departure point for the U.S. government regarding its natural disaster policies. Local, state, and federal officials also recognized the need to develop policies regarding planning and preparedness. On 1 April 1979, President Jimmy Carter signed a presidential order that created the Federal Emergency Management Agency (FEMA). Its mission remains to coordinate the response to disasters that have overwhelmed local and state resources. Following the attacks on 11 September 2001, Congress passed the Homeland Security Act of 2002 that created the Department of Homeland Security (DHS) and placed FEMA

under its jurisdiction. Two primary doctrinal manuals guide FEMA's operations. The first is the National Response Framework (NRF), which was published on 22 January 2008. It is a descendant of the National Response Plan (NRP). The second is the National Incident Management System (NIMS), which the DHS originally released on 1 March 2004. These documents highlight the responsibilities and procedures of local, tribal, state, and federal authorities, all other federal departments in addition to the DHS, and Non-Governmental Organizations (NGO) when responding to natural disasters (See Appendix C for more information on NRF and NIMS).

Yet they remain flawed. Nearly 100 years after the San Francisco earthquake, Hurricane Katrina made landfall in Florida on 25 August 2005 before entering the Gulf of Mexico. There it grew into a Category Five storm. When it made landfall a second time on the 29 August along the Mississippi and Louisiana coastlines, it carried Category Two winds, intense rain, and a strong storm surge that overwhelmed the levee system protecting New Orleans. The storm severed transportation, power, and communications networks along the Gulf Coast. By 30 August 2005, the levees failed, and water from the swollen Lake Pontchartrain began pouring into New Orleans.¹⁰

Although Mayor Ray Nagin suggested to the citizens of New Orleans that they evacuate the city, many did not heed his warning or were unable to leave. Those left behind faced very dangerous circumstances. Over 80 percent of the city was flooded; some areas were under as much as 20 feet of water. The city lacked potable water, and electric, sanitation and sewer systems were not functional, and looting became widespread.¹¹ Although America's perception of the national response and the reality on the ground diverge greatly, most Americans believed the federal government abandoned

the citizens of New Orleans, Louisiana, and Mississippi. Local and state leaders downplayed their own shortcomings and publically criticized the federal government for what they felt was a slow response, noting a need in medical support, water, food, shelter, and search and rescue assets.¹²

On 1 September 2005, at the direction of President George W. Bush and Secretary of Defense Donald Rumsfeld, NORTHCOM established Joint Task Force Katrina and placed LTG Russel L. Honore' in command.¹³ Eventually, the Department of Defense (DOD) deployed over 60,000 troops, 20 ships, 360 helicopters, and 93 fixed-wing aircrafts to the area. Unfortunately, due to a number of issues including logistical and coordination difficulties as well as staging limitations caused by the high floodwaters in the impacted areas, it took over a week before all the assets arrived.¹⁴ When the floodwaters finally receded, over 1,300 people were dead and damages exceeded \$130 billion. Hurricane Katrina proved to be the most expensive natural disaster in the U.S. history. It ended the career of FEMA Administrator Michael Brown and greatly diminished the legacy of President Bush's administration.¹⁵

Research Question

Using the Galveston Hurricane of 1900, the San Francisco earthquake of 1906, the Influenza Pandemic of 1918, and the Mississippi Flood of 1927, this thesis examines how U.S. policy for responding to natural disasters evolved during that 30-year period. What lessons, if any, regarding national and Army policies remain relevant? Are those lessons incorporated in current doctrine, training, and officer development or have those lessons of the past been forgotten, only to have to be relearned, most likely at cost of hundreds or thousands of casualties?

Assumptions

This thesis makes three assumptions. One, there will be no discoveries regarding the Galveston Hurricane of 1900, the San Francisco earthquake of 1906, and the Spanish Flu Pandemic of 1918, or the 1927 Mississippi Flood that would invalidate the arguments of this thesis. Secondly, these four case studies provide an acceptable means to answer the research question. Finally, there will be no significant changes or amendments to DHS or DOD policy or U.S. Army regulations regarding the response to natural disasters.

Definition of Terms

Commander's Emergency Authority: When a sudden and unexpected civil disturbance occurs which is caused by an emergency, a local Army commander is authorized to take immediate action, to include law enforcement operations, in order to save lives, preserve government functions, and maintain public order. The situation must meet three criteria: it endangers life or property or disrupts normal governmental process; the state and local government cannot control the situation; there is not enough time to pursue and receive authorization from the President.¹⁶

Federal Emergency Management Agency (FEMA): A federal organization established in 1979 that coordinates response operations among local, state, federal and non-governmental organizations (NGOs) during major disasters. It is responsible for prioritizing resources, ensuring efficient response, and preventing duplication of effort.¹⁷

Homeland Security Act: Public Law 107-296, 107th Congress, which was enacted 25 November 2002. Congress passed this legislation in response to the terrorist attacks on 11 September 2001. It formerly established the DHS and charged it with protecting the U.S., its territory, citizens, and infrastructure from external threats and natural disasters.¹⁸

Immediate Action: Authority granted army installation commanders to respond quickly to local disasters within the continental U.S. or its territories before a declared emergency or disaster. Commanders may provide immediate action, when requested, to save lives and protect property. However, they may not violate Posse Comitatus and must report the assistance rendered through the chain of command as soon as possible.¹⁹

Incident: Any natural or man-made occurrence that requires action at either a local, tribal, state, or federal level to minimize loss of life or damage to property.²⁰

Major Disaster: An incident of such magnitude that it overwhelms local and state resources and requires a commitment of federal funding, resources, planning, and time to respond to and mitigate its effects on the population.²¹

Man-made Disaster: A major disaster or incident whose proximate cause is from the actions of human beings regardless of intent. Man-made disasters include engineering failures, transportation accidents, industrial accidents, or weapons of mass destruction. Historical examples include the terrorist attacks in New York City, Washington DC, and Shanksville, PA on 11 September 2001, the reactor accident at the Chernobyl Nuclear Power Plant on 26 April 1986, or the boiler explosion aboard the steamship SS Sultana on 27 April 1865.

National Incident Management System (NIMS): Originally published in 2004 and revised in 2006 and 2009, this provides a template for governments at all levels, NGOs, and private stakeholders to prevent, protect against, respond to, and mitigate the effects of both domestic incidents and major disasters.²²

National Response Framework (NRF): Published in January 2008 by FEMA and DHS in response to the lessons learned during Hurricane Katrina, this document replaces

the NRP. It defines principles, roles, responsibilities, laws, and organizations for all local, state, and national elected officials as well as NGOs and emergency management practitioners during both small incidents and major disasters. Additionally, it attempts to establish a unified and comprehensive national response strategy.²³

Natural Disaster: Also known as an “act of God,” this term refers to any disaster or incident at the local, state, or federal level that occurs as a result of nature. Examples include tornadoes, hurricanes, plagues, or ice storms.

Posse Comitatus Act: Passed in 1878, this law outlaws the willful use of any part of the federalized Army or Air force to execute law enforcement functions unless expressly authorized by the Constitution or an Act of Congress. While technically, it does not apply to any other branch of service, the Navy and Marine Corps abide by its restrictions as well. It applies to the National Guard only when in federal status.²⁴

Recovery: The second phase following an incident or major disaster. This phase occurs after life-saving operations are complete and focuses on returning individuals to self-sufficiency.²⁵

Response: The initial phase immediately following an incident or major disaster. Operations taken by local, state, and federal agencies during this phase focus on saving lives, protecting property and the environment, and meeting basic human needs.²⁶

Stafford Act: Also known as the Disaster Mitigation Act, but officially named the Robert T. Stafford Disaster Relief and Emergency Assistance Act, this legislation outlines U.S. policy regarding response of major disasters. It authorized the President to utilize federal resources to assist states impacted by major disasters. Passed in 1989 and

amended in 2007, it also provides guidance to federal and state officials on the procedures to request and provide federal support.²⁷

Title 10 U.S. Code: Active Duty Army units, the Army Reserve, and federalized, or “activated,” National Guard forces fall under this status and are under the command and control of the President of the U.S. The president must federalize National Guard forces before they fall under this article. Forces under this status are restricted from performing many law-enforcement functions and are subject to Posse Comitatus.²⁸

Title 32 U.S. Code: National Guard units not federalized fall under this regulation. They remain under the command and control of the State Adjutant General who reports to the governor. The federal government may provide funding to the states subject to approval from the Secretary of Defense. Forces under Article 32 may perform law enforcement duties without violating Posse Comitatus.²⁹

Scope and Delimitations

This thesis only addresses natural disasters. There is a clear delineation in current U.S. policy between natural and man-made major disasters. While the suggestions and conclusions discussed in this thesis may be useful regarding both instances, they have not been analyzed regarding man-made occurrences.

Significance of Study

To many Americans, the scenes in New Orleans following Katrina were familiar. Over 20 years prior, on 24 August 1992, Hurricane Andrew, a Category Five Hurricane, struck Dade County in southern Florida. Until Hurricane Katrina struck, it was the most expensive and damaging hurricane in U.S. history. The local and state governments were

quickly overwhelmed. They requested federal support; however, they felt the resources were dreadfully slow in arriving. On 27 August 1992, an exasperated Kate Hale, the Dade County Emergency Management Director, vented her frustration during a national press conference asking, “Where in the hell is the cavalry on this one.”³⁰ To many in the federal government, Hale’s comments and the media criticism that followed were unfair. They contend local leaders were not familiar with national policy for disaster response and believe the problem still existed 20 years later in New Orleans. Additionally, they contend that municipalities and individuals remain woefully unprepared and the federal government cannot overcome this lack of preparedness at the lower levels. While everyone agrees better coordination and understanding between individuals, and the local, state and federal governments would improve disaster response and ultimately save lives, all stakeholders share the responsibility.

Summary and Conclusions

Over the past 110 years, America’s policies regarding the responsibilities of its local, state, and national leadership in response to major natural disasters have evolved considerably. During the 19th century, citizens expected the federal government to be small and stay out of the affairs local municipalities. Therefore, when tornadoes, earthquakes, floods, or pandemics struck an area, the afflicted citizens relied primarily on themselves, the goodwill of other citizens, and the support of NGOs, such as the Red Cross, for assistance. Given the technology of the time, often the U.S. Government did not even know of the severity of the disaster for several days. Thus, the national policy focused on appropriations to help rebuild after the fact while policies of preparedness or prevention, when applicable, were essentially non-existent.

The end of the 19th century and beginning of the 20th century brought an expanded era of globalization. Technology had made the world smaller. Telegraphs allowed communication across the country in minutes, versus days or weeks. Thus as information became more accessible, U.S. citizens became more aware of current events and more expecting of government assistance and leadership. Major disasters marred the first three decades of the 20th century. These events convinced America's leaders at all levels that prior planning and preparedness was essential to effectively respond to natural disasters. The influences and challenges of those early policies in many ways remain prevalent today.

Hurricanes Andrew and Katrina revealed weaknesses in preparedness and planning at the individual, local, state, and federal levels. Additionally, virtually instantaneous media coverage highlighted the suffering of victims, embarrassed leaders, and infuriated citizens. Americans' expectations were now far beyond anything leaders could have ever conceived of in 1900. They expected their leaders to develop well thought out and coordinated plans of action prior to disasters, manage disasters efficiently when they did occur, and to provide prompt leadership and resources. After Hurricane Katrina, leaders held congressional hearings, had debates, replaced personnel, conducted after action reports, and rewrote policies all in an effort to correct perceived flaws in the system. However, were these revelations new, or were they lessons learned over a hundred years ago that had since been forgotten or ignored?

¹Simon Winchester, *A Crack in the Edge of the World* (New York: Harper-Collins Publishers, 2005), 52.

²Ibid., 50-56.

- ³Erik Larson, *Isaac's Storm* (New York: Vintage Books, 1999), 5.
- ⁴Winchester, 50-56.
- ⁵John M. Barry, *The Great Influenza: The Epic Story of the Deadliest Plague in History* (New York: Penguin Group, 2005), 67-75.
- ⁶Larson, 5.
- ⁷Michael P. Malone and Richard W. Etulain, *The American West; A Twentieth-Century History* (Lincoln, NE: University of Nebraska Press, 1989), 56-57.
- ⁸Barry, 397.
- ⁹Joseph L. Arnold, *The Evolution of the 1936 Flood Control Act* (Fort Belvoir: U.S. Army Corps of Engineers, 1988), 18.
- ¹⁰Maximo Moore, "Rescuing DoD From Too Much of a Good Thing: The Wrong Kind of Disaster Response" (Monograph, School of Advanced Military Studies, 2006), 4-8.
- ¹¹Christopher Oscar, "Post Katrina: Redefining the Military Role in Homeland Security" (Research Project, U.S. Army War College, Carlisle Barracks, 2006), 1-5.
- ¹²Alane Kochems, "Military Support to Civilian Authorities: An Assessment of the Response To Hurricane Katrina" *Background* (November 2005): 1-8.
- ¹³Moore, 8-9.
- ¹⁴Kochems, 1-8.
- ¹⁵Moore, 8-9.
- ¹⁶Department of the Army, Field Manual (FM) 3-28, *Civil Support Operations* (Washington, DC: Government Printing Office, 2008), paragraph 4-23.
- ¹⁷Thomas Harrison, "Peacetime Employment of the Military—The Army's Role in Domestic Disaster Relief" (Research Project, U.S. Army War College, Carlisle Barracks, 1992), 8-9.
- ¹⁸Moore, 414.
- ¹⁹FM 3-28, paragraph 1-28.
- ²⁰FM 3-23, paragraph 1-13.
- ²¹*Ibid.*, paragraph 1-12.

²²U.S. Department of Homeland Security, *National Incident Management System (NIMS)* (Washington, DC: Government Printing Office, 2008), i-6.

²³U.S. Department of Homeland Security, *National Response Framework (NRF)* (Washington, DC: Government Printing Office, 2008), i-7.

²⁴Donald Currier, “The Posse Comitatus Act: A Harmless Relic from the Post-Reconstruction Era or a Legal Impediment to Transformation?” (Research Project, U.S. Army War College, Carlisle Barracks, 2003), 1-3.

²⁵U.S. Department of Homeland Security, *NRF*, 45.

²⁶*Ibid.*, 1.

²⁷Moore, 1-8.

²⁸FM 3-28, Paragraph 1-34

²⁹*Ibid.*, paragraph 1-33.

³⁰Bill Adair, “Ten Years Ago, Her Angry Plea Got Hurricane Aid Moving,” *St. Petersburg Times*, 20 August 2002, <http://www.sptimes.com/2002/webspecials02/andrew/day3/story1.shtml> (accessed 28 October 2009).

CHAPTER 2

LITERATURE REVIEW

Introduction

This thesis will analyze four natural disasters: the 1900 Galveston Hurricane, the 1906 San Francisco Earthquake and Fire, the 1918 Influenza Pandemic, and the 1927 Mississippi Flood. All four events occurred at an ideal time for contemporary study. They occurred long enough ago that the academic record is consistent. While there will most likely always be areas of confusion, historians have come to a general consensus on the chronology of events, the key personnel involved, and their actions and decisions. However, the events occurred in the relatively recent past. The pseudo-modern technology that existed in the early 20th century allowed for the communication, collection, and storage of numerous reports of the incidents and the nation's response. Thus, an accurate and consistent historical record exists.

The 1900 Galveston Hurricane

Regarding the Galveston Hurricane of 1906, *Isaac's Storm*, written by Eric Larson, is probably the current predominate text. The *History Channel* featured Larson in *Isaac's Story*, as part of its "Mega Disasters" series. John Edward Weems' text, *A Weekend in September* is also a definitive source on the topic. In addition to these two sources, primary references include, *Galveston Hurricane*, edited by Nathan C. Green, and *Storms, Foods, and Sunshine*, an autobiography written by Dr. Isaac Cline, the chief of The Galveston U.S. Weather Bureau Station at Galveston during the storm.

The texts are generally in agreement regarding the hurricane and its impact on Galveston. The storm materialized late in August of 1906 somewhere in the Atlantic Ocean along the coast of Africa. It was spotted for the first time on 30 August, 125 miles northwest of Martinique. On 1 September, it transited the coast of Puerto Rico at 12 miles an hour and on 4 September, it struck Cuba after passing the Dominican Republic. While not yet very destructive, the storm dumped tremendous amounts of rain on the island. The U.S. Weather service predicted the storm would continue to produce rain but little damage and would move toward Florida. Once there, it would continue north along the east coast before eventually dissipating. For two days, that appeared to be the case. On 6 September 1906, the storm damaged parts of Key West and Pensacola, Florida. There it met a high pressure system over southern Florida and abruptly changed direction, heading west into the Gulf of Mexico.¹ In the heated waters of the Gulf, it gained tremendous strength before hitting a relatively unprepared Galveston Island on 8 September 1906. Over an 18-hour period, it shattered the island with up to 15 feet of water, and 150 mile-an-hour winds. Before moving inland, the storm killed six thousand people, making it the largest casualty-producing storm in U.S. history.

In his autobiography, Dr. Isaac Cline claims that quite early in the day, he concluded the storm would cause severe damage and loss of life. With complete disregard for his own safety, he drove a wagon along the beach warning the beach goers to move to the interior of the island. He further states that he went inland three blocks and warned all the inhabitants in those locations that the oncoming floodwaters would most likely destroy their homes. Cline insists this action saved the lives of six thousand people.

Most sources repeat Cline's heroic assertion, including Professor Willis Moore, the Director of the U.S. Weather Service, as well as John Weems and Nathan Green.²

Larson doubts Cline's claim. He finds it suspicious that of the thousands of first hand reports in the Rosenberg Library archives in Galveston, none mention Cline's "Paul Revere-like" ride. Additionally, even by the morning of the storm, most accounts indicate the beach was already flooded and impassible.³ The most problematic aspect of Cline's version, however, is that he chose to shelter his family and up to fifty of his neighbors in his home, which was only three blocks from the beach. Eventually debris from a bridge rammed against the Cline house and shattered it. Isaac Cline's wife, Cora Mae, along with most his neighbors drowned.⁴

Cline deserves the benefit of the doubt to a degree. He personally designed and oversaw the construction of his home to handle any storm Galveston had previously experienced and it did indeed stand much longer than most the homes in the city. Additionally, while the Galveston library has thousands of statements in its archives, that is only a fraction of the population at the time and if Cline's story is true, many of the people he talked to were vacationers who left the island. Cline admits, "I first studied to be a preacher, but decided I was too prone to tell big stories."⁵ He was by all accounts, and intelligent, moral, and honorable man yet was prone to hubris and, following the storm, he tried to balance conflicting interests. His autobiography includes several hard to believe accounts, such as ostrich-egg sized hail storms, randomly appearing flash floods that swept stage coaches away, and summer rivers that would suddenly turn so cold fish would be unable to swim. Most likely, these events are based in fact, but somewhat embellished. Cline's account of his actions on 8 September 1900 probably falls into this

category as well. While it is unlikely Cline was as heroic as he and the Weather Bureau depicted, he exerted the best effort he could at the time given the limitations.

The 1906 San Francisco Earthquake and Fire

The literature concerning the 1906 San Francisco Earthquake and Fire includes accounts from the Presidio, the biography of Major General (MG) Adolphus Washington Greely, the man who commanded the federal recovery efforts, written by Brigadier General (BG) William Mitchell, and Greely's own autobiography. Additionally, numerous academic texts exist to include an MMAS thesis written by Floyd Davis titled, *Soldiers Amidst Rubble*, and an account published in 1971 by Gordon Thomas and Max Morgan Witts called *The San Francisco Earthquake*. In 2005, Simon Winchester published, *A Crack in the Edge of the World*, which currently is probably the preeminent source on the incident. The *History Channel* featured Winchester during a segment of its series 'Mega Disasters' titled *1906 San Francisco Earthquake*.

Winchester discusses a number of events seemingly unrelated to the earthquake and subsequent fire in the book such as the wanderings of Custer's scouts, an earthquake in Charleston, South Carolina in 1886, the California Gold Rush, the settling of the American West, and the breaking up of the super continent Pangaea into the seven continents known today. In these seemingly unrelated accounts, he explains the development of the study of geology in America. The literature agrees that while the fire that raged for three days following the earthquake is what truly destroyed the city, the proximate cause of the overall disaster remains the earthquake.

The 1918 Influenza Pandemic

There have been several texts and journal articles written regarding the 1918 influenza pandemic in recent years. Alfred W. Crosby's *America's Forgotten Pandemic: The Influenza of 1918*, first published in 1976 and rewritten in 2003, remains very influential. It is cited repeatedly in most texts as the first significant contemporary study including in Gina Kolata's *Flu*. John Barry's, *The Great Influenza*, published in 2004, is probably equally as influential today as Crosby's. Both historians are considered preeminent experts on the topic. Being the pandemic occurred ninety years ago, scholars generally agree on what happened and the chronology of events. The science, however, has evolved over time and has seen major breakthroughs in recent years.

Dr. Jeffery Taubenberger identified the 1918 Influenza virus in the 1990s. He classified it as a H1N1 strain. While there have been other H1N1 strains since 1918, this particular virus was unique. It killed young adults disproportionately, produced symptoms unusual for influenza, and most importantly, was approximately 25 times more deadly than a normal influenza strain.⁶ What caused the 1918 influenza virus to be so virulent remains a mystery. Somehow, it mutated at least twice during the pandemic from 1918 into 1919. This accounts for the three distinct waves of the disease. The first, which struck in the spring of 1918, had a higher mortality rate than the usual flu, but statistically not by much and physicians did not consider it a significant threat. Yet the first mutation led to a second, far more virulent wave that seemingly exploded overnight ravaging the world. The third wave, in late 1918 into 1919, was similar in virulence to the first wave. By the summer of 1919, the third wave dissipated.⁷

The 1927 Mississippi Flood

John Barry's text, *Rising Tide*, is currently the preeminent reference. Barry thoroughly examines the U.S. policies enacted to prevent flooding along the Mississippi River in the years prior to the flood, the weather in 1926 and early 1927 which eventually revealed the flaws in those policies, the reactions of local governments as the floodwaters rose, and the long term effect the flood had and continues to have on national flood policy. Several texts written since Barry published the book 1997 cite it repeatedly including, *Reports to Congress*, articles written by The Corps of Engineers, and a special report by *Risk Management Solutions*,. Another excellent source is Pete Daniel's, *Deep'n as it Comes: The 1927 Mississippi Flood*, which is also cited numerous times. Isaac Cline, the chief of the U.S. Weather Bureau during the Galveston Hurricane was stationed in New Orleans in 1927. His autobiography offers a firsthand account of the storms impacts and the somewhat controversial decisions made by its leaders.

Beginning in August of 1926 and continuing throughout the spring of 1927, unusually high rains fell persistently throughout the American Midwest. The constant, heavy rains eventually filled the tributaries of the Mississippi River beyond capacity. The excess water flowed into the Mississippi River itself. Although the U.S. Army Corps of Engineers (USACE) built a system of levees along the river to protect the Mississippi Valley from flooding, by early spring of 1927, the levees were saturated and unstable. On 16 April 1927, the first levee failed outside of Dorena, Missouri, and another followed less than a week later at Mounds Landing, 12 miles north of Greenville, Mississippi. Over the next two months, over 40 levees along the Mississippi River failed.⁸

Before the floodwaters finally receded in August 1927, 26,000 square miles were flooded with up to 30 feet of water. The flood impacted seven states and left over 700,000 American homeless. In a landmark decision, President Calvin Coolidge sent Secretary of Commerce Herbert Hoover to the region to administer the response and recovery efforts. This was the first time the federal government would actively control and coordinate response efforts to a major disaster. Hoover considered the flood the “greatest disaster of peace times in our history.” It was the catalyst for sweeping political, legal, social, and technical changes regarding how the U.S. prepares for, and responds to, major national disasters.⁹

¹Erik Larson, *Isaac’s Storm* (New York: Vintage Books, 1999), 116.

²Isaac Monroe Cline, *Storms, Floods, and Sunshine* (Gretna: Pelican Publishing Company, 1945), 94-95.

³Larson, 167-169.

⁴Cline, 93-96.

⁵*Ibid.*, 26.

⁶Gina Kolata, *Flu* (New York: Farrar, Straus, and Giroux, 1999), 4-8.

⁷Kolata, 303-306.

⁸Risk Management Solutions, *The 1927 Great Mississippi Flood: 80-Year Retrospective* (Newark, CA: Risk Management Solutions, 2007), 1-4, <http://www.rms.com/publications/> (accessed 3 November 2009).

⁹Joseph L. Arnold, *The Evolution of the 1936 Flood Control Act* (Washington, DC: Government Printing Office, 1988), 17-20.

CHAPTER 3

RESEARCH METHODOLOGY

Information Required

There are four categories of information required for this thesis. The first category is basic historical information. It provides the general context of what happened, the time of the occurrence, its location, and the overall consequences of the catastrophe. Raw data is included, such as number of victims, the percent of population effected, or the general size of the major disaster. Virtually every source had some basic information.

Additionally, newspapers and online sources provided concise accounts of basic information. Certainly, basic historical information is required to appreciate the significance of the event, but it does not provide more than a cursory review of the federal government's response to the catastrophe.

The second category is legal statutes, military doctrine, and federal policies. In order to analyze the influence previous events has on today's policy, a thorough understanding of the current federal procedures regarding major disaster response operations is required. DOD is usually not a provider of resources during response operations, unless the event is of catastrophic proportions. Therefore, understanding its regulations and determining how compatible they are with federal policies is essential. Finally, there are many legal caveats involved when utilizing military resources within the U.S. or its territories, especially U.S. Soldiers who fall under Title 10 of the U.S. Code. Understanding these statutes could explain the leaders' logic behind certain decisions.

The third category of information needed to complete this thesis is after action reviews or reports. The Government Accountability Office (GAO), the U.S. Military, and bipartisan congressional committees usually conducted these. Many times the best sources of analysis come from the military or policy makers themselves. After most significant incidents, these bodies conduct internal reviews that highlight areas of strength, areas of weakness, and plans for improvement.

The final category of required information is academic reports, books, and autobiographies. While never completely impartial, academic reports do provide critical analysis and they are less subject to biases or personal agendas. Autobiographies are far less impartial, but provide first-hand accounts of key leaders and confirm information from previous sources.

Methodology

One of the common criticisms of the federal government following major disasters is that it fails to learn from the past. Therefore, case studies of the 1900 Galveston Hurricane, the 1906 San Francisco Earthquake and Fire, the 1918 Influenza Pandemic, and the 1927 Mississippi Flood will be analyzed. These events were catastrophic in nature and occurred when federal disaster response was in its infancy. The case studies will include the following sub-categories: What Happened; The U.S. Government and Military's Role; The Aftermath; and Long Term Effects on Public Policy. The conclusion discusses long-term influences and lessons learned that remain pertinent today.

Conclusion

The federal policy for responding to major natural disasters evolved significantly since beginning of the 20th century. Analyzing the events highlighted above utilizing the methodology discussed in this chapter may lead to surprising conclusions regarding the influence those events should have on today's public policy.

CHAPTER 4

ANALYSIS

Organization of Chapter 4

This chapter analyses four case studies in chronological order: the 1900 Galveston Hurricane, the 1906 San Francisco Earthquake and Fire, the 1918 Influenza Pandemic, and the 1927 Mississippi Flood. Each case study is divided into four sections: What Happened, The U.S. Government and Military's Role, The Aftermath, and Long Term Effects on Public Policy. Several sections are further broken down into sub-divisions for clarity and ease of reading.

The 1900 Galveston Hurricane

What Happened?

Galveston, the Weather Service, and Isaac Cline

One of the U.S. Army Signal Corps' primary functions in the late 1800s was administering the U.S. Weather Service. Also known as the U.S. Weather Bureau, it had been part of the U.S. Army since its inception in 1871.¹ This was primarily because the service relied almost exclusively on the telegraph to receive and transmit reports and forecasts back and forth to observation stations located throughout the country.² In 1882, the service was embroiled in controversy. The former chief financial manager, CPT Henry W. Howgate, embezzled a quarter of a million dollars and managed to escape authorities after his arrest. These kinds of events were all too common in the service. At the time, many members of Congress and Secretary of War Robert T. Lincoln saw the service as incompetent, uncontrolled, and a waste of money.³

BG Adolphus Washington Greely, who would eventually command the recovery efforts following the San Francisco Earthquake and Fire, became the Chief Signal Officer of the Army on 16 January 1887. He held this post until 1890 when the Weather Bureau became part of the Department of Agriculture.⁴ Greely commented in his autobiography that when he arrived, he noticed that political allegiances dominated the weather service, especially regarding personnel and promotions. Employees were poorly trained and unfamiliar with both their equipment and the scientific theory of that equipment. Additionally, the service did not adequately supervise its personnel and the forecasts it produced were generally unreliable.⁵ While technology was a factor, often the unreliable forecasts were based off inaccurate or falsified reports from undisciplined observers in the field who failed to record observations several times a day in accordance with the bureau's mandates.

The service improved greatly during Greely's tenure. In his first year, he dismissed one hundred employees for incompetence or various offenses. He also began no-notice inspections of observation stations. This improved the accuracy of the reports submitted by the weather stations substantially, which subsequently improved forecasting. In January 1888, an inspector named Lieutenant J.H. Weber entered a station in Galveston, Texas and found it to be woefully below standard. In his report, he concluded the station was in "execrable" condition and suggested replacing its personnel. Greely concurred. He sent a young meteorologist with an excellent reputation and tremendous potential to take over the station and to establish first Texas-wide weather service. He was Dr. Isaac Cline.⁶

Galveston Island lies approximately two miles east of the Texas coast and runs southwest to northeast. The most southern point of the island in 1900 was San Luis Pass and its most northern location was the City of Galveston (at Fort Point). At its highest point, the island was a little over 15 feet above sea level, but in the city, the highest point was less than nine feet. To the island's northwest is Galveston Bay, and to the east and south lay the open waters of the Gulf of Mexico.⁷ Even in 1900, inhabitants living along the coast knew the Gulf had witnessed some of the worst storms in meteorological history. In 1780 alone, storms killed over 22,000 people and sunk numerous British, French, and Spanish war ships.⁸

The island itself had witnessed more than its share of disasters as well. When Cabeza de Vaca, the first European to visit Texas, found himself shipwrecked on Galveston in 1528, he named it "The Island of Misfortune." The name is more apt than he could have ever realized. Throughout the 19th century, Galveston's greatest source of calamity was yellow fever. In 1839, the year the city received its charter, a quarter of its population died from the disease. Another 400 succumbed five years later, and over 1,100 died due to the illness in 1867. Tropical storms threatened the island as well, but it usually survived with only minor damage.⁹ Other towns in the area were not as fortunate. Storms in 1875 and 1886 damaged Galveston, but killed several hundred people in the town of Indianola along the coast.¹⁰ After the 1886 storm, Indianola's citizens choose to abandon it instead of rebuilding.¹¹

While other towns in the area died, Galveston grew. By 1900, it was the fourth largest city in Texas and was leading Houston in a race for which city would be the preeminent port city. On the morning of 7 September 1900, the *Galveston News* reported

the census for the city at 37,000 residents, an increase of over 8,000 people in ten years.¹² Known for its elegant Victorian houses, huge mansions, vacation resorts, music halls, and picturesque gardens, it was per capita, the wealthiest city in the southwest.¹³ Its citizens were also privy to the latest in technology. While electric streetcars, long distance telephone service, and electric lights were a novelty throughout most the country, in Galveston, these innovations were readily available. Along Avenue B, also known as the Strand, the city's business district flourished. To locals, it was referred to as, "the Wall Street of the west."¹⁴ The city's true financial strength however came from its seaport, which included numerous docks, 44 steamship offices, and an international commercial center. Galveston was the biggest cotton port in the country and the third largest port overall.¹⁵

This is not to say Galveston was free from problems. Despite the wealth of its citizens, the municipal government of Galveston was essentially broke and therefore not able to pay for civil projects. Most the city's streets were made of wood or seashells and many remained simply sand. No roads in Galveston were paved with macadam.¹⁶ Then there was an issue of a sea wall. Following the Indianola disaster, a group of 30 city leaders, calling themselves the "Progressive Association," in keeping with the social movement of the time, resolved to build a barrier to protect the island from tropical storms. Galveston's *Evening Tribune* supported the endeavor, stating construction "should be commenced at once." E. M. Hatrick, the city engineer, designed plans for a ten-foot high sea wall to be built around most the island. Unfortunately, although the state of Texas authorized a bond to pay for the work, the process took several months and the

initial enthusiasm quickly diminished. By 8 September 1900, construction of a seawall had still not begun.¹⁷

The civil projects that Galvestonians were concerned about were the bridges that provided the city with both escape during times of calamity and tremendous profit. Consisting of four bridges, a wagon bridge and three railroad bridges, they connected the city to the mainland at Virginia Point, Texas. Each two-mile long trestle bridge was comprised of sections approximately one hundred and fifty feet long. Supporting these sections were pilings, driven into Galveston Bay.¹⁸

By 1900, Dr. Cline had been the chief weatherman in Galveston for 11 years. His brother, Joseph, also worked at the station as an observer.¹⁹ Through hard work and discipline, the Galveston weather station's performance improved significantly under Isaac Cline's supervision. Therefore, the citizens in Galveston held Isaac in high regard. On 15 July 1891, the *Galveston Times* published an article written by Isaac that contended, "it would be impossible for any cyclone to create a storm wave which could materially injure the city." Cline further suggested hurricanes generally do not strike Texas, which was too far west, and anyone who feared Galveston was vulnerable to a major disaster suffered from "severe delusion." Perhaps Cline wrote the article to assist the city with its race against Houston, or maybe it was simple hubris. Nonetheless, the document remains a black mark to Cline's legacy.²⁰ While Cline would one day be one of the nation's foremost experts regarding hurricanes, at 29 years old, he was not qualified to issue such a proclamation. Additionally, he overlooked significant contrary evidence, such as the storms of 1875 and 1886.²¹ The article gave the city a false confidence and helped put to rest any lingering fears among both the citizens in

Galveston and investors on the mainland concerning its vulnerability to major tropical storms, at least until 8 September 1900.²²

Tracking the Storm

Forecasting the weather in 1900 was limited at best, especially regarding tropical storms. There were no ship-to-shore radios or hurricane-hunting planes in existence yet, so once the storm moved into open water, meteorologists lost track until it reappeared along the mainland. The tools for predicting weather in 1900 were also limited. A thermometer was available to measure temperature and a barometer measured pressure. When the pressure dropped, this usually indicated a storm was approaching. Additionally, an anemometer, which looked like a cross bar with a cup attached to each end, measured the wind speed.²³ The bureau required observation posts throughout the U.S. and Caribbean Islands to observe the pressure, temperature, wind speed and general conditions and to send a report to the Weather Bureau headquarters in Washington, D.C. several times a day via the telegraph. After collecting and analyzing the reports, it would develop forecasts. Despite the improvements under Greely, weather predicting during the early 20th century was still more of an educated guess than exact science.

Professor Willis Moore, the chief of the U.S. Weather Bureau in 1900, exerted tremendous control over the bureau. Moore was politically ambitious and saw his current assignment as a stepping-stone to positions of greater prestige.²⁴ He believed predictions of tornados or hurricanes could cause panic and lead to criticism of him and the bureau. Therefore, Moore only authorized personnel located at the central office in Washington, DC to issue storm warnings, presumably after he personally approved them.

The first storm warning the Galveston Weather Station received was on Tuesday, 4 September at approximately 4:00 p.m. While it advised that there was a tropical disturbance over Cuba moving northward, it gave no further details.²⁵ On 5 September, Dr. Cline received good news. The Weather Bureau predicted the storm would continue to move northwest into Florida.²⁶ On the sixth, the weather service still believed the storm would make landfall east of the city. It issued warnings from Louisiana to New England, but not Galveston.²⁷ Experience told meteorologists working for the Weather Bureau that tropical storms always moved north once they began the track that this storm had begun, especially at this time in the season. However, early that morning, the storm did the unthinkable. After broaching the coast of southern Florida, it changed direction sharply and began moving west. By evening, it was south of Louisiana and moving toward Galveston. If there was a golden hour to warn the citizens of Galveston, this was it.

The storm's course was not its only source of confusion. Its character was the source of considerable debate as well. While it drenched Cuba on 4 and 5 September with approximately 24 inches of water, it caused only minor damage. Despite this, the Cuban meteorologists, who pioneered hurricane forecasting, believed the storm would swell into a major hurricane and make landfall along America's Gulf Coast. However, following the Spanish/American War, the U.S. Weather Bureau controlled all observations and forecasts coming from Cuba. Like most of the U.S. forces occupying Cuba, the bureau's meteorologists were ethnocentric. They believed the Cubans were prone to exaggeration, unsophisticated, and relied on non-scientific means to predict storms. To the U.S.

meteorologists, the storm would head north, be very wet, and remain an essentially harmless tropical depression.²⁸

Undaunted, the Cubans sent their predictions to the mainland. Moore was furious. He ordered the telegraphs between Cuba and New Orleans shut down. Thus, during the height of hurricane season in 1900, the most experienced hurricane predictors in the world feared a major hurricane was about to strike near Texas but their concerns were ignored, and the only man in the country authorized to publish storm or hurricane warnings was located 2,500 miles from the Gulf of Mexico. Dr. Cline never heard of the concerns of the Cuban meteorologists.²⁹

As late as the afternoon of 6 September, the bureau remained confident the storm would make landfall somewhere east of Galveston. From this information, Cline deduced the city would be on the west side of the storm when it made landfall, which is comparably much safer than east side. Additionally, as the report only mentioned a tropical storm and said nothing about a hurricane, Cline concluded the city would experience heavy rains and slight flooding, but would be relatively safe. In accordance with procedure, he hoisted two flags above the Levy Building, where the Galveston's Weather Bureau Office was located, to warn of an approaching tropical depression from the northwest. Then he went to the beach.³⁰

What he saw concerned him. Throughout the day larger and larger ocean swells began crashing upon the island from the southeast. By evening, they reached the streets closest the beach. Cline also noticed a north wind. He reported to the Weather Bureau that had he never seen such a rise in tide from one direction with a stiff wind from the other.³¹ The following morning, Cline noticed a thin haze of cirrus clouds from the

southeast followed by large strato-cumulus clouds moving from the northwest. By mid afternoon, the city was overcast. While Cline found all these phenomena unusual, meteorology had not yet discovered that these were warning signs of an approaching, significant tropical event.³²

The Hurricane Reaches Galveston

Early September 1900 was unseasonably warm in Galveston. Temperatures that week were still above 90 degrees and the humidity was unbearable. Most of city's residents were aware that a tropical storm was approaching, but they experienced tropical storms before and few, if any, realized the danger. Even after the storm changed course, Galveston was still not especially concerned. When the hurricane eventually made landfall throughout the day and evening of 8 September 1900, however, it carried winds estimated to be in excess of 125 miles an hour and flooded the city with up to 15 feet of water. Over 6,000 individuals lost their lives that day, making this the most deadly hurricane in American history.³³

The storm began approaching the island around 4:00 a.m. Citizens living within two or three blocks of the beach noticed that the water was knee high and the swells were growing in size. Cline recorded his first observations at approximately 5:00 a.m. The winds were less than 20 miles an hour, but they were coming from the northwest. This was unusual for a high tide. Additionally, he noticed the barometer reading was beginning to fall.³⁴ By 9:00 a.m., many of the bathhouses along the beach had floated a block or two inland and the rain was now heavy. To local Galvestonians, there was no need for concern. The water was the result of the "offshoot" of the tropical storm Cline warned them about. To the children in the city, the weather brought a break from the heat

and an opportunity for fun. They splashed in the water, floated toy boats and rafts down the street, and jumped from their porches into the growing puddles.³⁵

Yet by noon, the mood began to change. The floodwaters were rising 15 inches an hour and perhaps half the city was experiencing some degree of flooding. Homes along the beach were already experiencing three to four feet of water. Due to flooding, the outlying areas of the island were isolated and streetcars had stopped running. Cline reported to Washington that the barometer was falling rapidly and winds gusts were between 60 and 75 miles an hour. Of greater concern, the wind changed direction and was now from the northeast. This movement in wind direction indicated an oscillating storm system, consistent with a hurricane. The heavy rains continued, most of the city had lost power, and telephone service was down.³⁶

By 4:00 p.m., both Isaac and Joseph were very concerned. Even the highest point in the city was now a foot under water and several buildings had collapsed.³⁷ One such structure, located in the heart of the city, was Ritter's Café. When its roof collapsed, five people died instantly. The waiter drowned attempting to get help. The water level continued to rise rapidly, but Cline could not say how quickly because the rain gauge had already blown away.³⁸ Joseph sent a telegraph to Washington stating, "Gulf rising rapidly; half the city now under water." This would be the last message telegraphed from Galveston on 8 September 1900.³⁹ Soon thereafter, the wind gauge blew away as well. Its maximum reading was 100 an hour. With their instruments inoperable and the telegraph service down, Isaac and Joseph decided to return to their family.⁴⁰

As Isaac and Joseph walked home around 5:30 p.m., the entire city was flooded. Isaac recalled that Galveston was no longer technically an island, "just the ocean with

houses standing out of the waves which rolled between them.” The wind was driving debris into other structures and into roofs, causing those buildings to collapse.⁴¹ The red slate roof tiles on most of the city’s homes proved a tremendous danger. Following a fire in 1885, city leaders passed an ordinance requiring all homes in Galveston to have slate tiles on their roofs instead of wooden shingles. The winds picked up thousands of these tiles and projected them throughout the city, killing many unfortunate individuals.⁴² The Clines realized without a doubt that a major hurricane was upon them, but they were now powerless to assist the city.

Throughout the night, the situation grew steadily worse. The wind began to shift direction, now coming from the east. By approximately 6:30 p.m., it reached over 125 miles an hour. The eye of the storm also arrived around 6:30 p.m. In the eye, low pressure and rising air essentially lifts the level of the ocean. This creates the storm surge. In seconds, the waters already flooding Galveston rose an additional four feet.⁴³

The Cline Home

Following the earthquake of 1906, investigators concluded structures built of quality materials, solid construction techniques, and anchored on solid ground survived relatively well. This point does not quite hold as true when dealing with a hurricane. It is true that most homes in Galveston were anchored into soft sand and those structures did collapse. However, their foundations really were irrelevant. The flood and wind threw debris, sometimes weighing hundreds of pounds, into the sides and roofs of homes, churches, brick business buildings, saloons, or the train depot. This debris broke structure after structure into pieces. A good example of the effect the wind and flood had even on the strongest of houses is the Cline home.

The Cline home was three blocks from the beach along the southern tip of the city. Like many homes on Galveston, its first floor was over five feet above sea level. This was the high water mark for the worst flooding in the city's history, the 1875 hurricane. Isaac Cline designed the house to withstand the worst imaginable weather the Gulf could produce and oversaw its construction.⁴⁴

When Isaac and Joseph finally returned to the Cline residence, they found 50 people sheltered in the house, including many of its builders.⁴⁵ Due to the rising water, they had to move up to the second floor early in the evening. In his autobiography, Cline states that he believed the house would weather the storm. However, at approximately 6:30 p.m., just as the eye of the storm arrived, one of the trestles from the bridges that connect Galveston to the mainland broke from its moorings. The trestle, pushed by the gulf swell, crashed into the Cline home.⁴⁶

The house, separated from its foundation, floated briefly in the water before rolling over and breaking apart. Isaac found himself caught up in debris and assumed he would soon drown. After losing consciousness, he awoke free from the debris floating in the water. He located his brother and three daughters.⁴⁷ Cora Mae, Isaac's wife, "never rose from the water." She and the approximately forty-five other people sheltered in the Cline home drowned.⁴⁸

The U.S. Government and Military's Role

Both the U.S. Government and the regular Army played a very small role in the recovery and an even smaller role in the response. When the storm struck, the military maintained a garrison of regular Soldiers from Battery O of the First Artillery on the island. Commanded by Captain (CPT) W.C. Rafferty, Battery O serviced both ten-inch

cannons and eight in mortars as well as rapid-fire coastal artillery from one of two locations on the island. During the storm, its personnel were unable to perform any response functions at all. Like the private citizens of Galveston, they were simply trying to survive.

Fort Crockett was located about two miles southwest of the city in an area known as Denver Resurvey. Although designed to withstand a Spanish bombardment, by 2:00 p.m., several feet of water had inundated the facility. The barracks and gun emplacements were beginning to collapse.⁴⁹ CPT Rafferty ordered the barracks evacuated and the Soldiers sent to a school a few blocks away. However, their movement was confused and the personnel became separated. At least three drowned.⁵⁰ Several other Soldiers took shelter wherever they could find it, often knocking on the doors of private residences. Another 12 refused to enter the tempest, preferring to stay in the barracks. An hour later, the building collapsed, killing seven of them.⁵¹

The other military installation, Fort San Juan Jacinto, located within the city, fared no better. With all communication to the mainland cut off, the artillerymen began firing cannon in the middle of the afternoon and continued doing so throughout the night. People hunkered down along the coast of mainland Texas heard the guns, and realized the fort was attempting to relay a request for assistance. But there was nothing anyone could do. Eventually the floodwaters crested the walls of the fort and the firing stopped.⁵²

Remarkably, CPT Rafferty quickly gained accountability of his men after the hurricane. By the following afternoon, he confirmed 28 men from the battery were dead. Although Congress passed the Posse Comitatus Act, which forbid using regular Army Soldiers in domestic law enforcement over 20 years beforehand, surviving personnel of

Battery O augmented the police force to prevent looting. This would not be the only time the PCA was violated, nor would it be the only time the violation was essentially ignored.

Additionally, that afternoon news of the disaster reached Houston when a few survivors made their way from the destroyed city. They sent urgent requests for assistance to both Governor J. D. Sayers and President William McKinley. By Monday, the national newspapers reported the disaster. The Associated Press stated, “The city of Galveston is wrapped in sackcloth and ashes. She sits beside her unnumbered dead and refuses to be comforted. Her sorrow and suffering are beyond description. Her grief is unspeakable.”⁵³

By current standards, the federal response following the Galveston Hurricane was remarkable by how limited it was, and how acceptable that limited response was to Galveston and the country. President McKinley ordered the Secretary of War to provide tents and rations to Galveston as needed, but that was essentially the extent of federal support. The Texas Militia (National Guard) replaced the regular Army Troops from Battery O and no additional federal troops were utilized. CPT Rafferty was not punished for violating the PCA. Private citizens and NGOs assisted the city greatly. For example, Andre Carnegie donated \$20,000 and William Randolph Hearst sent a train filled with relief supplies.⁵⁴ Additionally, the Red Cross, under the control of Clara Barton, hurried to Galveston to administer to the survivors. They provided food and limited clothing.⁵⁵

Aftermath

The city was in ruins. Large piles of wood and debris that were once neighborhoods littered the landscape.⁵⁶ The storm destroyed 3,600 homes, and most the hospitals, churches, and governmental buildings, to include city hall. The estimated cost

of damages, by 1900 standards, was \$28 million.⁵⁷ Tales of horror abounded. One such story involved Saint Mary's Orphanage, located two miles west of the city directly on the beach. The large building was home to 93 children and ten Sisters of the Incarnate Word who staffed the facility.⁵⁸ On 8 September, the entire orphanage washed into the Gulf. Apparently, just before the building collapsed, the nuns tied the children to themselves with rope. Only three of the children and none of the sisters survived. During the recovery effort, laborers discovered the nuns' remains, sometimes with the children still lashed to them.⁵⁹

Mayor Walter C. Jones began organizing relief efforts the following day. He organized a committee of prominent citizens to administer relief and declared Martial Law. Additionally, he deputized several citizens to assist the overwhelmed police department. The sheriff ordered them to shoot on sight any looter found trying to steal necklaces or rings from the dead.⁶⁰ The sale and consumption of alcohol was also outlawed and the saloons were closed. While there was limited looting, most the survivors behaved nobly and Mayor Jones lifted Martial Law on 21 September.⁶¹

The first task was to determine the best policy for disposition of the dead. The survivors wanted to see their loved ones identified and buried, but this was not possible. Initially, the city attempted to bury all the victims in large mass graves; however, there were simply too many victims to bury in a timely manner. Therefore, the community attempted to float the dead out into the Gulf of Mexico and bury them at sea.⁶² The city established a barge and laborers loaded it with over 700 victims. The laborers, mostly African-Americans impressed into service by the city and given copious amounts of alcohol to assist in the task, then drove the barge into the Gulf. They were to weigh down

the dead and consign them to the sea. To add to Galveston's horrors, the tide brought hundreds of the dead back to the island the following morning. From then on, with no other option available, the city burned its dead where they were found. The fires burned for months.⁶³

Although many Galvestonians left the island permanently, most remained and rebuilt. Those efforts began immediately and with remarkable efficiency. Grocery stores reopened by 13 September. On that day, newspaper, mail, and telegraph service resumed as well. By the 17th, long distance telephone service was restored, and on the 18th, the Santa Fe Railroad, after rebuilding the bridge over the bay, resumed service.⁶⁴

To prevent a similar disaster in the future, Galveston finally constructed a sea wall. Completed in 1904 at less than two million dollars, the wall is 16 feet thick and 17 feet above low tide, higher than the flooding during 1900 storm.⁶⁵ It still stands to this day, and while it had protected the island for over 100 years, it was unable to protect Galveston against Hurricane Ike on 12 September 2008. Additionally every building in the city was raised on jacks and sand was pumped in from the Gulf of Mexico to serve as fill beneath the structures. This amazing feat of engineering deposited 14 million cubic yards of fill onto Galveston and raised over 2,600 structures, the largest being a 300- ton church. The project, completed in 1910, raised the city to 17 feet above sea level.⁶⁶

Long Term Effects on Public Policy

The Federal Government made no significant changes following the Galveston disaster. Despite its magnitude, this was a local issue and the federal government in 1900 was expected to leave local problems to local municipalities. Therefore Texas and Galveston leaders oversaw the recovery effort. By contemporary standards, this policy

may seem unacceptable, yet to President McKinley and the country, this was appropriate policy. In a former confederate state, 20 years after reconstruction, the concept of regular army troops and the federal government essentially occupying Galveston was unpalatable for both local and federal authorities.

One tenet of Progressivism was to establish efficient local governments. While no evidence exists to suggest the mayor and officials in Galveston were corrupt, the storm and subsequent recovery highlighted the inefficiency of the governmental system in the city. Therefore, the citizens adopted a new one. Instead of electing a mayor to be chief executive, they established a city commission to manage the municipality.⁶⁷ The committee organized by Mayor Jones the day following the disaster came to be known as the “Central Relief Committee.” It was broken into departments such as disposition of the dead, finances, caring for the injured, or law enforcement. Galveston’s new charter incorporated this same concept. The new Galveston Commission included five members, four department heads and the mayor who served essentially as chairman of the board of elected commissioners.⁶⁸ The general population elected all five members to two-year terms and each member had specific responsibilities. This form of government prevented overburdening one person with too many responsibilities and many small towns throughout the country soon adopted similar systems.⁶⁹

The Weather Bureau distanced itself from any culpability regarding the disaster. Chief Moore quickly released a statement praising the work of the Weather Bureau for warning the city of an approaching hurricane, which was blatantly false.⁷⁰ He further declared that he had ordered hurricane flags raised above Galveston as early as Friday, which was also untrue.⁷¹ Cline points out in his autobiography that while the central

office provided him timely updates regarding the storm, “neither emergency nor hurricane warnings were received from the forecaster.”⁷² Nonetheless, the country was more willing to accept what they read in the newspapers and far less cynical than today. Editors throughout the country lauded both Moore and Cline for saving the lives of thousands. However, while the federal government did not publically criticize the Weather Bureau for its role in the disaster, the War Department revoked Moore’s ban on Cuban forecasters within a week.⁷³

While it is easy to blame Moore or even Cline, again weather forecasting was very limited in 1900. Chief Moore and the Weather Bureau experienced additional frustrations. In 1901, the night before McKinley’s second inauguration, he promised good weather. It rained. Eight years later, again Moore promised “record breaking” good weather for the inauguration of President Taft. Ceremonies were held inside because of heavy snow.⁷⁴ While newspapers poked fun at Moore’s embarrassment, these incidents highlight how imprecise weather forecasting was in the early 20th century.

Regarding the Galveston Hurricane, Isaac Cline later commented in his autobiography, “This being my first experience in a tropical cyclone I did not foresee the magnitude of the damage which it would do.”⁷⁵ He remained with the Weather Service for another 30 years and rededicated his life to the study of hurricanes. In 1924, he published a landmark meteorological text, *Tropical Cyclones*, an analysis of hurricanes between 1900 and 1924. Professor Moore however, left the Weather Bureau in disgrace on 16 April 1913.⁷⁶

Despite the best efforts of Galveston’s citizens and leaders, the city was never able to regain its standing as a preeminent port city. During its reconstruction, ranchers

discovered oil on mainland Texas. It quickly replaced cotton as the chief Texas export, and Houston, being inland and far less vulnerable to hurricanes, gained investors' confidence. Today, Houston has population of over two million people, is the largest city in Texas, and the fourth largest city in the country. Galveston is a popular resort town with a population comparable to 1900. Additionally, as Hurricane Ike proved in 2008, it is still incredibly vulnerable to hurricanes.

The 1906 San Francisco Earthquake and Fire

What Happened?

The City

The Pacific Ocean borders the city of San Francisco to the west while the San Francisco Bay borders it the north and east. Thus, it lies along the northern edge of a peninsula. Across the bay are the cities of Oakland and Berkeley. The original topography was comprised of bedrock, sand dunes, and marshes, and the area was generally hilly and lush.⁷⁷ Spanish settlers originally called it “Yerba Buena” after a popular wild mint that grew in the area. In 1776, while George Washington was leading the Continental Army against the British in the American Revolution, Spain established a military fort and a Catholic mission in the area. Both the fort; the Presidio San Francisco, and the mission; Misión San Francisco, were named in honor of Saint Francis.⁷⁸ In 1835, American settlers and traders began moving into the area in small numbers. Ten years later, Yerba Buena was still a small trading outpost of 200 inhabitants when the American Army seized it during the Mexican War. To prevent confusion, the Chief Magistrate, LT Washington Bartlett, decreed the entire area would have the same name as the military fort, San Francisco.⁷⁹

On 24 January 1848, James Marshall discovered gold in the Sierra Mountains of California.⁸⁰ That summer, the federal government agreed to accept gold dust for \$16 an ounce and established a mint in San Francisco to produce coinage. Within two months, the government paid out over eight million dollars. Literally, within weeks, San Francisco grew from a small village to a major port and city as people all across America and the world abandoned their previous lives in an attempt to make a fortune at gold prospecting.⁸¹

The city never looked back. By 1906, the population swelled to over 400,000 people, making San Francisco the ninth largest city in the country. Businesses, especially railroad, finance, and manufacturing industries, invested heavily. As a port city, it exported greater than \$65 million worth of goods annually.⁸² The city boasted grand hotels such as the Palace and Fairmont, 600 saloons, 40 bookshops, and a dozen photography studios. On Nob Hill, railroad executives lived in mansions that rivaled anything in Connecticut or Long Island, New York. Perhaps its crown jewel, City Hall, which took 26 years to build at a price of over six million dollars, was the largest building west of Chicago.⁸³

Yet San Francisco had significant problems in 1906. Violent crimes, especially murder, were common. Although the city was proud to showcase numerous grand structures and wealth, the vast majority of its buildings were tightly packed, poorly constructed wood frame homes, lean-tos, or shacks. The Barbary Coast was home to brothels, bars, drunks, scoundrels, and all sorts of nefarious activities.⁸⁴ Within the center of city was Chinatown, a nine-block, area that housed approximately 55,000 highly discriminated against immigrants who initially came to America to escape the Taiping

Rebellion.⁸⁵ While the entire city remained prone to fire, these two areas were especially vulnerable. Additionally, unregulated factories showered much of the city with soot and ash. Finally, as the city lacked an adequate sewer system, it dumped thousands of gallons of sewage into the bay and into China Basin, an especially disgusting cesspool to the south of the city. As a result, in April 1906, for most people living in San Francisco, it was a filthy, unhealthy, and a dangerous place to live.⁸⁶

The city government was also notoriously inept and corrupt. The mayor was a former musician named Eugene Schmitz. Although recently reelected to a third term in 1905, Schmitz was not the true decision maker in San Francisco. The real master was a crooked lawyer named Abraham Ruef. Most individuals and corporations understood that if they wanted to conduct business in San Francisco, whether legitimate or otherwise, Ruef, Schmitz, and the political machine would need to be paid off beforehand. The water, gas, electric, and railroad companies as well as the whorehouses and bars all felt it was wiser to pay grafts to “oil the skids” with the corrupt officials than try to fight the city’s bosses. Ironically, on the day of the quake, city officials learned that William Burns of the Secret Service was investigating corruption in San Francisco upon the order of President Theodore Roosevelt. In keeping with the Progressive movement, the investigation would eventually put Ruef in prison and end the corruption in San Francisco. However, this did not help on 18 April 1906.⁸⁷

While Ruef and his colleagues gave little thought to preparing the city for fires or earthquakes, these disasters occurred with some regularity in the bay area and posed a challenge to truly concerned city leaders. Earthquakes had occurred throughout the 19th century, notably in 1836 and 1865. The most remembered, however, occurred on 21

October 1868. It killed 35 people, but only five in the city itself. The earthquake smashed windows, shattered chimneys, and even destroyed a number of buildings. Although a relatively minor earthquake, locals referred to it as the “Great San Francisco Earthquake” for nearly 40 years thereafter.⁸⁸

Despite the earthquakes, the greatest fear was fire, which was inevitable given the poor construction, stiff winds from the San Francisco Bay, overcrowding, and lack of city planning. In 1851, a fire destroyed 18 blocks, killed a number of citizens, and caused \$12 million worth of damage. The event led to the creation of the city fire department in 1852. Additionally, city leaders wrote building codes and began city planning.⁸⁹ Overly ambitious leaders and contractors eventually ignored these codes however and fires continued to plague the city. Six major fires occurred in San Francisco during the latter half of the 19th century.⁹⁰

By spring of 1906, Fire Chief Dennis Sullivan had been a firefighter for 25 years and the Chief Engineer of the San Francisco Department for 12. Unlike many of the leaders of the city, he was by all accounts, extremely competent and incorruptible. That put him at odds with Mayor Schmitz and Abraham Ruef. Sources of contention involved readiness of the city should a major fire erupt. That the vast majority of the city’s structures remained poorly constructed and tightly packed together concerned the chief, but he could do little about that. He did, intend, however, to mitigate the risks by modernizing the department.

Chief Sullivan was successful to a limited degree. During his tenure, the fire department abandoned an outdated warning system that depended on a mostly volunteer force responding to bells and whistles during an emergency and developed into a fully

paid, modern department.⁹¹ With 85 stations strategically placed throughout the city and a staff of 700 well-trained firefighters, the department could respond to emergencies 24 hours a day.⁹² It relied on water mains to provide water to the 4,000 hydrants in the city.⁹³ However, Sullivan believed the water supply system was inadequate. He wanted to purchase a fireboat that could pump seawater from the bay to establish an auxiliary water supply system should the hydrants ever fail. He also strongly suggested renovating the long neglected water cisterns below the city so they could also provide water if needed. Finally, in conjunction with the War Department, Sullivan wanted to develop teams of men who would use explosives to establish fire breaks should a major fire erupt. The War Department agreed to store dynamite at the Presidio and to conduct training for both U.S. Army Soldiers and Sullivan's men. However, San Francisco would have to provide \$1,000 to build a storage facility. Mayor Schmitz, citing fiscal difficulties, continually refused Sullivan's requests.⁹⁴

Ironically, on Tuesday 17 April 1906, the day before the earthquake, Judge W.W. Morrow convened the San Francisco Citizen's Committee at City Hall to discuss a report by the National Board of Fire Underwriter's regarding the city's fire readiness posture. It concluded, "San Francisco has violated all underwriting traditions and precedents by not burning up. That it had not already done so is largely due to the vigilance of the Fire Department, which cannot be relied upon indefinitely to stave off the inevitable." Despite this stark warning, Mayor Schmitz did not sponsor a meeting on the issue for seven months. The board scheduled Sullivan to testify on 18 April. By that time, however, the city was ablaze and Sullivan was mortally injured.⁹⁵

The Earthquake

For an earthquake to occur, at least three measuring stations anywhere in the world resourced with a seismograph must observe and record the activity. On 18 April 1906, shortly after 5:00 a.m., 96 stations across the world recorded an event along the western coast of the United States.⁹⁶ A large foreshock occurred at 5:12 and was followed by a massive earthquake that erupted about half a minute later and lasted 30 to 45 seconds. Its epicenter was a mile southwest of San Francisco in the Pacific Ocean. There the western coast of the United States edges slightly to the east. As a result, the San Andreas Fault, which is mostly below land mass, finds itself beneath the San Francisco Bay.⁹⁷ The earthquake was massive. It measured between 7.7 and 8.25 on the Richter scale and was felt as far north as Coquille, Oregon, almost 400 away. Tremors were reported as far south as Los Angeles, again close to 400 miles from the epicenter. Winnemucca, Nevada, 345 miles away marks the furthest recorded easterly tremors.⁹⁸

While Californians well remember the earthquake's effect on San Francisco, it also damaged much of the surrounding area to include San Jose, Stanford University, and Santa Rosa, which was essentially destroyed.⁹⁹ Survivors later described the ground rolling as if it was on waves in the ocean, which is an apt description of the seismographic waves that tore through the city. The earthquake left the streets cracked and the city's telegraph, telephone, and cable car services inoperable. It also destroyed numerous homes, churches, hotels, prisons, brothels, saloons, government offices, and libraries. Several thousand buildings lay in ruins.¹⁰⁰

Yet much of the city was still standing, at least for the time being. The two most important factors regarding how well a building survived the earthquake were its location

and the quality of its construction. Well-constructed structures built into the bedrock survived quite well while even those anchored into compacted sand survived relatively intact. Buildings erected on previous marshes, however, often failed. To construct anything on the wetlands, builders first had to fill them in, often with sand, sometimes with the debris of previous fires or earthquakes. Seismologists refer to this type of ground as “made land.” During the earthquake, tremors forced the water below the made land to the surface where the ground and water mixed in a process known as “liquefaction.” Liquefaction made the ground waterlogged, unstable, and eventually it collapsed.¹⁰¹

An extreme example of the consequences of liquefaction was the four-story Valencia Street Hotel. Located between 18th and 19th Streets, it was built upon made land that was once a small lake. When the earthquake struck, a few fortunate patrons ran from the building and watched in horror as the building leaned forward and sank three levels. Only those on the fourth floor, which was now at ground level, were able exit the hotel safely. While rescuers frantically attempted to save those trapped in the lower floors, at least 100 people died. Two days later, fire forced rescuers to abandon the hotel altogether with many of the dead still trapped inside. They were incinerated.¹⁰²

The second determining factor on how well a building survived the earthquake was the quality of its construction. Well-built wooden structures absorbed the shock surprisingly well. Unfortunately, many were poorly constructed. In addition, builders utilized notoriously poor techniques when erecting the brick or stone buildings and chimneys. Often, bricklayers applied mortar to only one side of the brick or would not wet the bricks during construction. This prevented them from bonding with the mortar properly. Reinforcement of brick or stone buildings during construction was rare. Many

buildings had inadequately anchored floors and roofs that collapsed.¹⁰³ Not surprisingly, steel framed and metallic reinforced structures generally survived well, as did reinforced brick buildings and building made of concrete. For example, the U.S. Mint, built on solid ground with good techniques, withstood the earthquake with only minor damage. Ironically, the building still exists, but is abandoned because the cost of bringing it up to today's earthquake codes is too high.¹⁰⁴

Examples of the result of poor construction include the Hall of Justice, the Majestic Theater, the Wells Fargo Building, and San Francisco's crown jewel, City Hall. Instead of being a grand tribute to modern technology, it illustrated the corruption, incompetence, and waste of San Francisco's leaders. The U.S. Geological Survey conducted an analysis of how well several buildings in the city fared against the earthquake. They noted, "Only structures of first class design and materials and honest workmanship could (have) survived." The report was especially critical of city hall concluding, "The building was a monument of bad design and poor materials and workmanship." Despite its several million-dollar price tag, the building stood in ruins following the quake. Its sides had collapsed, its massive columns fell, and its cupola was left hanging perilously supported by a cobweb of bent and failing beams.¹⁰⁵

The Fire

Although the earthquake caused tremendous damage, it was eventually only responsible for between three to ten percent of the overall damage done to the city. The fires the earthquake sparked proved to be a far greater calamity. Following the earthquake, San Francisco was a perfect environment for a conflagration. The city consisted of thousands of tightly packed wooden buildings, combustible debris was

everywhere, the bay provided a warm, dry breeze, and the earthquake shattered gas mains and knocked down electric lines. Additionally, Chief Sullivan's predictions regarding the water supply system proved accurate. The earthquake severed most of the water mains, making the 4,000 hydrants useless. Chimneys also proved to be an enormous hazard. Perhaps 95 percent of the chimneys in the city fell, killing and injuring innumerable individuals. One such chimney fell from the California Hotel onto the Fire Department's Chemical Company Number Three, mortally wounding Fire Chief Sullivan within minutes of the earthquake.¹⁰⁶

Numerous fires emerged after hot chimneys full of hot ash, coals, and sparks fell. Fires also began as stoves, fuel tanks, and cooking ranges tipped over. Another fire resulted when a woman attempted to prepare breakfast unaware that earthquake destroyed the flue to her wood burning stove. The legendary "Ham and Egg Fire" destroyed much of Hayes Valley, an area that included Van Ness, Octavia, McAllister, and Market Streets and numerous churches, hotels, offices, and the remains of city hall.¹⁰⁷

By seniority, John Dougherty replaced Dennis Sullivan as San Francisco's Fire Chief. Although 69 years old, he provided superb leadership and inspiration to the department as it valiantly fought the fires over the next three days.¹⁰⁸ Despite heroic efforts however, the department was thoroughly overwhelmed. It was unlikely that any fire department in America would have fared much better. Because of the earthquake, communication among the firehouses was virtually nonexistent and there was no water supply to stop the 20 to 30 fires ranging throughout the city. The fires eventually combined into a massive conflagration.¹⁰⁹ Within one day, four square miles of the city

either was on fire or destroyed.¹¹⁰ As it grew, it consumed both material and the oxygen in the area, thereby creating a vacuum. At its peak, the fire created its own wind. It emitted hot gases away from the flames only to ignite additional fires in new locations where oxygen still existed. The heat of the fire was so intense that granite buildings, several blocks from the flames, simply collapsed because the mortar that held the rocks together failed.¹¹¹ Over three days, the fire reduced 70 percent of the city to smoldering ruins. It destroyed approximately 26,000 acres of land, over 28,000 buildings, and left over 200,000 people homeless.¹¹²

The U.S. Government and Military's Role

The Army

When the earthquake and fire occurred, there were few contingency plans between the military and the government of San Francisco. In 1904, MG Arthur MacArthur Jr. commanded the US Army Pacific Division. Early that year, city leaders, at the bequest of Chief Sullivan, asked him if they could rely on the Army to assist with detonating buildings and structures in the city should a massive fire occur. MacArthur agreed and directed the Presidio, located outside San Francisco, to be prepared should such a need arise. Because the city refused to help fund the storage facility, no training or concrete policies were established. Nonetheless, a modicum of understanding existed, at least in the eyes of the military leadership in San Francisco.¹¹³

The U.S. regular Army during the early 20th century consisted of approximately 3,700 officers and 56,000 enlisted men. Most of these men served overseas. In the continental U.S., the Army was broken into four divisions, each commanded by a Major General (MG). Divisions were sub-divided into Departments, usually commanded by a

brigadier general (BG). In 1906, the commander of the Pacific Division was MG Adolphus Washington Greely, the former Chief Signal Officer of the Army. His subordinate commander, BG Frederick Funston commanded the Department of California. Both headquarters were located in San Francisco. Numerous small military installations, to include the Presidio, Fort Mason, Fort McDowell, Fort Point, Fort Baker, Fort Barry, Alcatraz Island, and Benicia Barracks, were all within 25 miles of the city.¹¹⁴

At 62 years old, Greely began his career as a private during the Civil War and had been in command of the Pacific Division for less than two months when the disaster occurred.¹¹⁵ Prior to the earthquake, Greely was a relatively well-known figure throughout the country. While the military and Roosevelt Administration considered him a superb administrator and credited him for salvaging the U.S. Weather Bureau, most Americans knew him for leading a failed expedition to the arctic in the early 1880s that cost the lives of 19 members of the 25-person crew. He was travelling to Chicago at the time of the disaster however to attend his daughter's wedding. Therefore, BG Funston was the acting commander.

Funston had served with distinction in Cuba during the Spanish American War and in the Philippines during the Filipino Insurrection. He received the Congressional Medal of Honor for capturing the insurgent leader Emilio Aguinaldo in 1899 and was wounded numerous times in combat. By all accounts, Funston was an aggressive and decisive leader. During the first few days following the earthquake, these traits served him well.¹¹⁶ At forty years old, he was also far younger than Greely and reportedly more concerned with results than regulations. That also would become apparent over the next few days.¹¹⁷

Response

Funston's private San Francisco residence was at 1310 Washington Street. Immediately after the quake, he walked up Nob Hill to assess the situation. Seeing the damage to the city, noticing the fires that were already beginning, and realizing the water mains were broken, Funston concluded the local government would not be able to manage the crisis. Therefore, without authorization, he issued orders to subordinates at nearby military installations to begin moving into the city. Later that day, Funston was able to telegraph a message to the War Department, pointing out that he would do everything in his power "to render assistance" and trusted that the War Department and President Roosevelt would authorize any action he took. The following morning Secretary of War, William Taft replied, stating that he would send tents and rations, and that the administration would support Funston.¹¹⁸

Captain Meriwether Lewis Walker was the commander of a small garrison neighboring the Presidio called Fort Mason. About 6:45 a.m., a civilian who claimed to represent BG Funston woke him. The civilian told Walker that Funston was ordering him to muster his men, move them to the Hall of Justice in San Francisco, and report to Mayor Eugene E. Schmitz for duty. Funston ordered Soldiers from the Presidio, Angel Island, and Fort Miley to report to the mayor as well.¹¹⁹ Over the next four days, Funston brought additional infantry, artillery, and coastal artillery troops into the city as well. Their mission was to secure federal facilities and assist the local authorities with fire fighting and maintenance of law and order.¹²⁰ Following Funston's orders, Regular Army Soldiers soon reported to San Francisco authorities who dispatched them to neighborhoods to prevent looting and to search for survivors. Over the next three days,

Soldiers fought fires, evacuated citizens, assisted law enforcement, conducted patrols, and guarded banks, City Hall, federal buildings, and the Sub-Treasury of the US Mint.¹²¹

Ironically, the three to four days following the earthquake and fire were perhaps Mayor Schmitz's finest. He quickly assembled a council of fifty businessmen and civic leaders that would become known as the "Citizens Committee of Fifty." The committee first met at the remains of the Hall of Justice and served to assist the mayor in developing policy for responding to the crisis. The night of the earthquake, he issued a proclamation warning police or regular Army Soldiers would shoot looters without further warning and requested citizens to stay off the streets at night. Shortly thereafter, he prohibited the consumption or sale of alcohol. Funston and his subordinates, in a spirit of subordinate cooperation with the locally elected government, enforced the mayor's mandates. Nonetheless, as many citizens saw regular Army Soldiers playing a prominent role, they mistakenly believed that Funston declared Martial Law, which never occurred.¹²²

The afternoon of the earthquake, the mayor and acting Fire Chief Daugherty ordered Colonel Charles Morris, the commander of the Presidio, to provide explosives and Soldiers to create firebreaks.¹²³ They teamed artillery and engineer Soldiers with police and firefighters, and ordered them to destroy structures with dynamite in accordance with MG MacArthur's agreement. However, nobody acted on the agreement and therefore neither the soldiers nor civilians received training beforehand on the task. Through inept, but well-meaning use of explosives, they accidentally sparked numerous additional fires. One such example occurred at the Viavi Medicine Factory on Green Street. The explosion of the building sent burning wood and rafters into parts of the city

that were yet untouched by fire, resulting in another inferno.¹²⁴ In another instance, poor technique led to a premature detonation that killed LT Charles Pulis.¹²⁵

The mayor and the Committee of Fifty met twice a day throughout the crisis. The encroaching fire forced the mayor, the committee, and BG Funston to relocate their headquarters several times. Eventually, after three days, the fires burned themselves out. Although the fire destroyed over 500 city blocks, Soldiers and firefighters eventually perfected their explosive techniques and established effective firebreaks that prevented the flames from spreading even further. The fire department, ably led by Chief Dougherty, fabricated salt-water hydrants and searched relentlessly for fresh water hydrants that still worked. Had it not been for heroic efforts of all these individuals, the fire would have most likely consumed the entire city of San Francisco.¹²⁶

Recovery

This thesis focuses on response and not recovery; however, as the Army played an integral role during the recovery of San Francisco, thoroughness demands brief discussion. As MG Greely explained in his autobiography, he returned to San Francisco on 22 April 1906. When he returned, the city was still smoldering despite BG Funston's "energetic and efficient" leadership. The next day he held a meeting at Fort Mason with Mayor Eugene Schmitz, a representative from the governor's office, Judge Morrow from the Red Cross, and Funston. Schmitz asked Greely to take command of the relief operations.¹²⁷ Greely pointed out that he did not have the legal authority to command the relief efforts, but would do so only if the civilian leadership publicly declared an inability to handle the situation internally. They did so immediately. Greely then telegraphed Secretary Taft and declared that the situation was so exceptional that a senior

leader from the federal government should control operations. The War Department officially authorized the occupation of San Francisco by U.S. Army regular Soldiers on 26 April with Greely in command.¹²⁸ Taft also sent Dr. Edwin T. Devine, an experienced relief administrator as his personal representative to assist Greely.¹²⁹

Greely's administrative skills proved invaluable as he faced several immense problems. By his initial account, the disaster killed over 500 people and left over 200,000 homeless. Debris clogged the streets and hampered relief efforts. Many transportation, water, telegraph, and telephone services survived the earthquake but were now inoperable due to the fire. The disaster destroyed approximately 90 percent of the grocery stores in the city leaving a massive food shortage.¹³⁰ Small pox and typhoid were already prevalent and the city feared a general pestilence would soon follow.¹³¹ On 29 April, Greely published the recovery plan in General Orders Eighteen.¹³²

One issue Greely did not have was shortages of supplies. As promised, Secretary Taft sent tents and rations to San Francisco on 18 April and they began arriving before Greely returned to the city. Additionally, Major Carroll A. Devol, the San Francisco Depot Quartermaster, was able to send telegram to Washington DC requesting further emergency supplies. Again, the Army responded quickly. The Quartermaster General of the Army ordered 43 garrisons throughout the country to begin shipping blankets, tents, cots, stoves, office supplies, urinals, buckets, utensils, clothing, shoes, cots, and even wheelbarrows to San Francisco immediately. The installations responded with unprecedented vigor. The estimated value of the supplies San Francisco received, in 1906 dollars, was well over one and a half million dollars. Additionally, the War department ordered several cavalry and infantry battalions to be prepared for emergency duty in the

city.¹³³ As in Galveston, The Red Cross, private citizens, and foreign countries provided tremendous support as well. Japan alone contributed a quarter of a million dollars to the recovery effort.¹³⁴

Within a week, however, the amount of supplies began to cause Greely considerable consternation. He informed the War Department that he had received 860 rail cars and 19 steamers worth of supplies and that they were causing congestion. Greely used three Army transport ships as floating warehouses and was contacting for storage space at \$2,500 a day, but still did not have enough space. By 24 April, Greely reported to the War Department that he had received enough supplies and asked them to stop shipments.¹³⁵ Greely assigned MAJ Devol to oversee transportation and storage of supplies. Devol established depots throughout the city and in Oakland. They first accounted for supplies before filling requests. This prevented duplication of effort and ensured supplies were not wasted.¹³⁶

In Greely's assessment, the most urgent need was food. The Army, private donations, and the state of California provided approximately five million rations. Nevertheless, as there was no organized distribution system, some individuals were hoarding rations while others received none.¹³⁷ Greely, ordered Colonel Lea Febiger to oversee rationing. On the first day, 314,000 persons were in need of food. However, Greely feared that continuously providing free rations stymied recovery. Therefore, Febiger established a food card system to control rationing and began charging minimal fees for rations. Additionally, the military contracted food distribution.¹³⁸ Eventually, the number of individuals requiring rations reduced to approximately 15,000, the average number of destitute in San Francisco before 18 April.¹³⁹ Greely's intent was to ensure all

the city's inhabitants received food rations equally to include minorities. When a woman asked him why she had to eat at the same table as African Americans, he kindly responded, "Doubtless they are hungry."¹⁴⁰

Greely next focused on shelter. The Army provided over 50,000 tents and cots from military installations throughout the country. Under Greely's direction, his staff divided the city into six relief districts, several near military installations. District Number One was at the Presidio, Number Two the Golden Gate Park, and Number Three was at Fort Mason. The military established several temporary camps on federal reservations as well. Soldiers built four camps each with a capacity of over 16,000 persons on the Presidio alone.¹⁴¹ Citizens received an identification card specifying the camp they 'lived' in. Each camp had an officer in charge and a surgeon who attended to sanitation and health. Stringent medical orders and inspections minimized communicable diseases.¹⁴²

Clothing was also an immediate issue. The Red Cross, the state of California, and the Army provided much of the clothing requirements. Eastern charities also donated clothes, but Greely felt the cost in time and resources of unpacking, sorting, and distributing what were often "unsuitable, unfit, and worthless" clothes was not cost effective. Again, Devol's depots proved invaluable, receiving, sorting, and issuing hundreds of thousands of articles of clothing.¹⁴³

Troops remained stationed throughout the city to prevent looters or rioting. Saloons and liquor stores remained closed and the military confiscated the stocks of alcohol. Soldiers were still technically authorized to use deadly force if necessary. While city leaders worried that overzealous Soldiers might shoot San Francisco citizens, both

Greely and Funston stressed in their after action reports that no regular Army Soldier killed a resident of San Francisco and looting was greatly minimized.¹⁴⁴

Over a 70-day period, Greely's force of 5,000 federal Soldiers augmented with Marines, Sailors, and National Guardsmen continued the roles Funston initiated. Additionally, they built semi-permanent housing, some of which ironically still stands to this day, oversaw food and water distribution, treated hundreds of injured citizens, helped reestablish the city's transportation system, oversaw debris removal, and developed sanitation systems.¹⁴⁵ The entire time, Greely demanded an accurate accounting of expenditures and continuously prompted civilian authorities to take control of systems as soon as they became capable.¹⁴⁶

Aftermath

MG Greely turned over administration of the relief effort to the Red Cross and city officials on 2 July 1906. As late as August, regular Army Soldiers continued to guard federal and local government buildings throughout the city.¹⁴⁷ There was some criticism of the way the Army conducted operations. During the fire, Soldiers destroyed several homes with dynamite and forced citizens to leave without allowing them to collect personal belongs. Citizens who lived in the more expensive houses along Van Ness Avenue were highly upset with military authorities for destroying homes located blocks away from the fire. Soldiers had to restrain owners and in some cases physically remove them from their houses.¹⁴⁸ MG Greely stressed in his after-action report the destroyed structures created the firebreak that salvaged the western part of the city. He also pointed out that many people die during building fires after returning to their homes because they felt the danger had passed or they tried to retrieve belongings.¹⁴⁹

A second issue was perhaps more detrimental to the Army. Despite Funston and Greely's claims to the contrary, many San Francisco inhabitants continued to insist Soldiers needlessly shot civilians for looting and participated in looting themselves. Some estimated that regular Army troops killed over a 100 people. One report even stated 500. Most civilian and Army leaders disputed such reports as exaggerations. They claimed that while a few Soldiers may have engaged in criminal activity, the vast majority performed their duties admirably. Greely commended the Soldiers, Sailors, and Marines under his command for being "unusually well-behaved." He highlighted that he only had to discipline one Soldier for misconduct. He summarized the entire episode, stating, "There were no murders, no riots, no epidemic, no formal criticism, and no one went hungry or unclothed. Perfect harmony marked relations with civil authorities."¹⁵⁰

MG Greely, BG Funston, and the Soldiers, Marines, and Sailors under their command received glowing praise for the apparently low casualty rate and relatively smooth relief effort. On 12 June 1906, the California State Legislature passed Senate Concurrent Resolution Number Four commending them for quick action and dedicated service. The governor, the mayor, private citizens, and the press all repeated the same sentiments.¹⁵¹

Some local and federal officials privately argued BG Funston blatantly violated Posse Comitatus. According to the statute, many of the actions he ordered were illegal unless authorized in advance by the President or Congress. While under today's law he may have argued Posse Comitatus would not apply as Immediate Action authorized him to utilize Soldiers to destroy civilian homes with dynamite and Commander's Emergency Authority would authorize him to use Soldiers in a law enforcement role for a limited

time, no such exemptions existed in 1906. Nonetheless, the War Department essentially ignored the potential problematic issue. As William Mitchell argued, while Funston's actions may have violated the Constitution, he was compelled to act by "necessity and humanity."¹⁵² Funston continued a very successful career that included serving as the commandant of Fort Leavenworth. Many historians suggest that had he not died of a heart attack on the eve of World War I, he and not General Pershing would have commanded Allied forces during that conflict.¹⁵³

Long Term Effects on Public Policy

City leaders feared San Francisco would lose its standing among major cities and be replaced by Los Angeles or Oakland much like Houston surpassed Galveston. For this reason, the Committee of Fifty rebuilt the city at an amazing rate. Unfortunately, in their haste, they did not stop to consider what lessons could have been learned from the earthquake and fire. Therefore, the disaster had minimal immediate effect on the long-term public policy of the city and the nation.

To ensure San Francisco citizens and investors stayed, the city initiated a public relations campaign to minimize the disaster. As part of the campaign, the San Francisco Real Estate Board passed a resolution officially naming the disaster the "San Francisco Fire." The thinking is obvious. Fires are preventable, but earthquakes are not. Investors would not want to sink huge sums of money into an area vulnerable to devastating, and uncontrollable earthquakes. A freak fire on the other hand, while unfortunate, was more palatable, and most importantly, preventable. Another example of this information campaign was the official death toll that listed 428 persons killed by the major disaster. Even then, most survivors rolled their eyes at such a low number. Private research in the

late 20th century conducted by Gladys Hanson, a city archivist, concluded the earthquake and fire killed over 3,000 inhabitants¹⁵⁴

The San Francisco Earthquake and Fire occurred only six years after the Galveston Hurricane and federal policy and public thinking had not changed in that brief period. This was a local issue and the impacted state and municipalities were responsible for overseeing the response. Federal policy allowed for appropriations to help the local area recover, but there was no FEMA to assist local leaders or to coordinate activities. Additionally, no mandates that required federal departments to accomplish support functions existed. This was not a failure on either the federal or the state governments. It was more a result of the continued thinking following the Civil War and Reconstruction. The public did not want a large federal government and feared anything that could be perceived as a federal occupation.

As for San Francisco, its leaders and citizens wanted to rebuild quickly. Initially they passed new zoning, fire, and building codes into law. However, the codes slowed construction and added to cost. Within a year, city leaders repealed the codes, the original city grid was reestablished, and contractors again erected buildings on bad soil utilizing inferior construction techniques. Of greatest concern, city officials allowed contractors to use the debris from the earthquake to create more made land. The site of the 1915 Panama-Pacific Exhibit, which signified the rebirth of the city to the world, was on made land that became the Marina District. A second issue was the first floor of most homes. With the growth of the automobile, homeowners renovated the bottom floor of their home into garages. These “soft bottoms” now lacked the lateral bracing essential for surviving earthquakes

After 1950, the city began implementing stringent building codes and developing disaster response planning. Nevertheless, while recently constructed buildings are of excellent quality, perhaps two thirds of the city was built before 1950. On 17 October 1989, a 6.9 earthquake, known as the Loma Prieta Earthquake, highlighted the city's vulnerabilities even in the modern era. Like in 1906, the made land failed, broken gas and electric lines spurred fires, and response was thwarted by broken water lines and degraded communication systems. The city was spared however because a fireboat, aptly titled, *The Phoenix*, was able to provide an auxiliary water supply and hundreds of volunteers aided the overwhelmed fire department in squelching the fires before they grew into another conflagration. Nonetheless, the event was responsible for 63 deaths, and destroyed or damaged over 14,000 structures. The Marina District, which was created from the debris of the 1906 disaster, experienced liquefaction and suffered the most extensive damage.¹⁵⁵

The 1918 Influenza Pandemic

What Happened?

The 1918 Influenza pandemic was perhaps the greatest casualty-producing event in world history. While estimates vary, most scientists agree that between 50 to 100 million people died from the virus between spring 1918 and the summer of 1920, and perhaps as much as 500 million people, one third of the world's population at the time, were infected. In the U.S., a quarter of the population displayed reportable symptoms. It infected 40 percent of the Navy and 36 percent of the Army. Between 500,000 and 675,000 Americans died from the disease, many between 20 and 40 years old. Combined

with the losses from World War I, it reduced the life expectancy for American citizens from 51 in 1917 to 39 in 1918.¹⁵⁶

Yet, for the most part, America has erased the 1918 influenza from its memory. Perhaps it happened so fast. The casualty rate in the U.S was highly concentrated into a four-month period between October 1918 and January 1919.¹⁵⁷ Also, its peak, autumn 1919, was overshadowed by the end of World War I. Thus, in effect, the horrors of the influenza became a footnote to the horrors of the Great War. Finally, Woodrow Wilson and his administration barely even acknowledged its existence worried that to do so could hurt the morale of the country. Most countries refused to acknowledge the flu out of what known at the time as “military necessity.” One of the first to do so was Spain, who had remained neutral during the war. Its newspapers reported the influenza before any others in Europe. As a result, many laymen and Soldiers on the front assumed incorrectly the pandemic had begun in Spain, thereby giving it its name, “Spanish Flu.”

The Great Spanish Influenza Pandemic of 1918 most likely began in Haskell County, Kansas, a sparsely populated farming locale in the southwest corner of the state. There are other possibilities, namely China, India, or France, but historical evidence most strongly suggests it originated there.¹⁵⁸ Founded as part of the Santa Fe Trail during the western expansion in the middle of the 19th Century, Haskell County remained much like any other farming county on the Great Plains. Its towns, Santanta, Sublette, Santa Fe, Jean, and Copeland were small, isolated, and had a population density of approximately three people per square mile. Virtually everyone was involved in farming. Crops dominated the landscape while farmers raised and butchered poultry and pigs in close

proximity to each other. Although they did not realize this at the time, the close proximity of the pigs and birds may have enabled the virus to survive and infect humans.¹⁵⁹

Haskell County's Doctor at the time was Dr. Loring Miner. Although a frontier doctor, he had trained himself on germ theory, built his own small laboratory, and used new antitoxins such as diphtheria and tetanus to fight diseases. In early January and February 1918, Miner noticed an outbreak of influenza in the county. Outbreaks in small farming communities were common at that time, but this seemed unusual. While patients displayed symptoms common with influenza, such as headaches, unproductive coughing, body aches, and fever, it was unusually lethal and its symptoms were remarkably violent. At the time, federal policy did not require reporting epidemics of influenza. Officials considered it too common and too minor a threat to public health to track. Yet Miner reported it anyway. In early spring 1918, *Public Health Reports*, a weekly journal published by the U.S. Public Health Service listed "influenza of the most severe type" as a local epidemic in Haskell County, Kansas.¹⁶⁰

Haskell County was a very isolated in 1918. In fact, many of the towns from that time no longer exist. Had this been any other time, the influenza virus most likely would have stayed within western Kansas and died out as after being unable to find new hosts. However, this was during World War I. The influenza that emerged in Haskell County Kansas, moved with the county's residents to Fort Riley, Kansas where a cantonment area, called Camp Funston, ironically named after the hero of the San Francisco earthquake, had been established to train new recruits that would be sent to Europe. The virus spread throughout the camp and infected several thousand of the 56,000 green troops living there. Yet it only killed 38. When these Soldiers left for Europe, they took

the virus with them and once in Europe, it spread throughout the world. Initially, the influenza seemed to be nothing more than a minor hindrance. Many Soldiers and civilians were infected; however, the overall number of killed was not much worse than a normal flu season, and on the front, where deaths due to disease was rampant, it was barely noticeable. This was the first wave of the 1918 Influenza Pandemic.¹⁶¹

The number of waves varies depending on the interpretation of the data, but most historians agree there were three. The first wave occurred in early 1918 and as discussed above, was comparably mild. The second wave occurred throughout the world in the fall, and was by far the most deadly. It was relatively short however, and by the middle of November 1918, it seemed to have dissipated. Yet, a third wave occurred in December of 1918 into the spring of 1919.¹⁶² Compared to the second outbreak, the third wave was relatively minor. Some locations did not experience this wave at all. Yet it was still lethal. In a few locations, mostly in the Western U.S., the third wave was actually the most deadly. In Phoenix, three consecutive days in January 1919 set records for new cases that shattered records from the previous fall.¹⁶³

When people refer to the horrors of the Spanish Flu, they refer to its second wave. It killed throughout the world in unimaginable numbers. In the U.S., it began in a military cantonment outside of Boston, Massachusetts called Camp Devens. It spread quickly to Boston and then throughout New England. To support the war, the military shipped Soldiers throughout the country and the world for training or deployment. The mutated virus was soon in all corners of the country, including the territories of Guam, Puerto Rico, Alaska and Hawaii. Three examples of the second wave, Camp Grant, Philadelphia,

and San Francisco highlight the actions and errors made throughout the U.S. by leaders, experts, and private citizens as they attempted to combat it.

Camp Grant

Colonel (COL) Charles Hagadorn was a consummate Soldier. A member of the West Point Class of 1889, he never married and had no children. His devotion was to the Army and his troops. On 8 August 1918, COL Hagadorn assumed command of Camp Grant in Illinois. Designed to hold approximately 30,000 men, the camp was well over capacity. On 20 September 1918, seeing over 10,000 Soldiers in tents, and with winter approaching, he decided to disregard Army regulations concerning how many troops could be housed in each barracks unit and overcrowded the buildings. Those who wrote the regulations did not do so out of concern for comfort, but to ensure the health of the camp and the increased crowding concerned the camp's physicians. They warned him that the influenza was creeping across the country and several Soldiers from Camp Devens, where influenza was raging, recently arrived.

Nonetheless, the Colonel was confident he could keep his Soldiers safe. As a former chief of staff in the Panama Canal Zone, he was very familiar with fighting communicable diseases and Camp Grant had superior medical facilities and staff. It received accolades during every medical inspection the Army conducted and in recent years, as measles, small pox, and scarlet fever had attacked mostly every other Army cantonment, Camp Grant had remained epidemic free. Still, he instituted a few precautions. Soldiers were to oil down all the roads on camp to prevent dust and all Soldiers with flu symptoms would be quarantined. The following day, over 100 troops who arrived from Camp Devens reported to sick call with flu symptoms. As COL

Hagadorn ordered, doctors immediately quarantined them. Physicians issued masks and orderlies hung sheets in between each man's bed. COL Hagadorn also cancelled all social gatherings and closed the camp to visitors.¹⁶⁴

These measures would do little good. COL Hagadorn was unaware that the virus was most contagious before symptoms appeared. By time the symptoms of the flu were at their worse, the victims were no longer contagious at all. Ironically, by overcrowding the barracks to keep his Soldiers safe, the caring yet uniformed colonel had actually made his men far more susceptible. The next day 194 Soldiers reported to sick call and on the following day, 371.

Camp Grant soon repeated the scenes of Camp Devens and every other military cantonment camp annihilated by the flu. In less than a week, the camp hospital, which had 610 beds, was treating 4,102 patients. There were not enough doctors, nurses, ambulances, medical facilities, bandages, or medicines. Just the task of collecting the belongings of the dead was overwhelming. The commander conceded virtually all aspects of camp operations to his medical staff. He cancelled training, quickly erected seven additional hospitals, and ordered Soldiers to build hundreds of additional beds. Despite his efforts, the influenza had taken hold of Camp Grant and there was little COL Hagadorn could do to stop it.¹⁶⁵

The Army Surgeon General, William Gorgas, demanded that transferring of troops cease until the pandemic ran its course. Additionally, he wanted the practice of escorting Soldiers who had died home halted. Nevertheless, the war and "military necessity" continued to take priority. Eventually, the Army issued orders to halt transfers, but the order was vague and only applied to Soldiers who displayed symptoms. In

accordance with this directive, COL Hagadorn authorized the shipment of over 3,100 Soldiers to Camp Hancock, some 915 miles away in Augusta, Georgia. The humid, cramped, stagnant, and poorly ventilated train cars provided an ideal environment for the virus to spread. When the Soldiers finally arrived, over 700 went directly to the camp hospital and another 1,300 reported to sick call within the next few days. The influenza soon overwhelmed Camp Hancock as well.¹⁶⁶

On 4 October 1918, over 100 Soldiers from Camp Grant died and another 5,000 were ill. COL Hagadorn instituted desperate measures. Soldiers received germicidal sprays into mouths and noses. They also gargled a mouthwash cocktail composed of iodine and glycerin twice daily. Again, these measures had little effect.¹⁶⁷

While the death toll on the camp extended beyond 450 and was continuing to rise, the *Chicago Tribune*, in an attempt to control the morale of the citizens in the area, reported the influenza epidemic broken and that hundreds of Soldiers were returning to duty after fully recovering. It is likely that hundreds of Soldiers did recover. Even at its worse, the vast majority of influenza victims survived; however, this is one of many examples of the press at the time distributing a message that tried to diminish the risks or effects of the influenza most likely out of a noble yet ill-conceived concern for the war effort.¹⁶⁸

COL Hagadorn did not die from the flu. He never even caught it. However, the anxiety of helplessly watching so many of his men die, combined with the knowledge that many of them were dying because of decisions he made, proved too much for him. On 7 October 1918, he shot himself in the head with his pistol.¹⁶⁹

Philadelphia

In the summer of 1918, Philadelphia's civic priority was also supporting the war. Before the conflict, its population was approximately 1.7 million citizens yet during the war, it swelled by another 300,000 people.¹⁷⁰ The increase resulted from the numerous war-related industries to include the world's largest shipyard and numerous munitions, steel, and locomotive factories.

However, the additional personnel led to the growth of the city's slums. In 1918, Philadelphia had the largest African American population of any northern city, and up to 400,000 immigrants.¹⁷¹ Almost all these individuals were either relatively poor or lived in abject poverty.¹⁷² The slums of Philadelphia were considered worse than even New York City's Lower East Side. Most the buildings did not have running water and the outhouses often serviced dozens of families. Up to four families shared apartments with several people sharing a bed or sleeping in shifts. All these conditions produced an environment ideal for the influenza virus to flourish.¹⁷³

In addition to Philadelphia's physical environment, inept and corrupt local government and mob influence also burdened it. By the summer of 1918, many of the city's leaders, including the major, were under indictment for murdering a police officer during the previous election. He provided little leadership and no public remarks concerning the influenza epidemic throughout the crisis. The streets remained filthy despite several million in contracts for cleaning them awarded to Edwin Vare, a Republican State Senator, notorious organized crime head, a true boss of Philadelphia. Social programs for the poor were non-existent, as was an orphanage or even a high school.

On 30 June 1918, the British Freighter *City of Exeter* entered the Delaware Bay and docked in the city. Although much of crew immediately went by ambulance to a secluded ward at Pennsylvania Hospital with the flu-like symptoms, city officials did not quarantine the remaining crew or cargo. Several of the crew died within days of arrival. The citizens of Philadelphia had already heard rumors of the effect the Spanish Flu was having on Soldiers in Europe. Nonetheless, city officials did not want morale of city or the output of war material to suffer. Local newspapers quoted two physicians who emphatically denied that the men had died from influenza. They were lying. Fortunately, for the time being, the flu did not spread. The sailors were no longer contagious by the time they reached the city. However, city leaders established a precedent of covering up the flu, not taking precautions, distorting facts, and willingly reporting falsehoods regarding the pandemic. The next time, Philadelphia was not so fortunate.¹⁷⁴

On 7 September 1918, 300 sailors from Boston, which was reeling from influenza, arrived in Philadelphia. Four days later, 19 sailors reported sick and this time, being under naval control, they were quarantined.¹⁷⁵ Three days later, however, 334 sailors departed Philadelphia and sailed for Puget Sound. By the time they arrived, hundreds were ill and several soon died. Soon thereafter, Puget Sound was also overwhelmed by the flu. Back in Philadelphia, 87 sailors reported sick. By 18 September, over 600 sailors required hospitalization. With the naval hospital overwhelmed, navy officials sent sailors to the city's Pennsylvania Hospital.¹⁷⁶

Despite the growing evidence of an oncoming epidemic, Philadelphia's Health Director, Dr. Wilmer Krusen continued to deny publically that there was an influenza threat. He did not order any precautions, did not identify additional nurses or doctors

should they be needed, and did not stockpile supplies. Again, such actions could raise concern and hurt morale. On 18 September 1918, under pressure from several physicians, Krusen agreed to institute a campaign against sneezing, coughing, or spitting in public, but continued to emphasize the city was safe.¹⁷⁷

On 19 September, two sailors died. Lieutenant Commander R.W. Plummer, the chief health officer for the Philadelphia Naval District declared the disease had peaked, and the local newspapers eagerly printed his comments. The next day, 14 more sailors died as well as the city's first civilian. On 21 September, another 20 victims, including a nurse from Pennsylvania Hospital died. That same day, the Philadelphia Board of Health finally made influenza reportable. Krusen continued to reassure the public. Although he conceded that a couple civilians had died, he felt confident the epidemic was being "nipped in the bud" and the flu was of the usual variety, not the dangerous form that had attacked military bases or other cities across the country. The city board of health issued a statement agreeing with him, although they suggested people avoid crowds.¹⁷⁸

Yet on 28 September 1918, despite the suggestion to avoid crowds, Philadelphia held the largest parade up to that time in its history. It was a Liberty Loan Parade, designed to sell war bonds. Physicians, faculty from the local medical schools, and infectious disease experts strongly suggested that Krusen cancel the parade. He refused, stating that Philadelphia had to meet its war bonds quota. They then contacted reporters and wrote editors, but no paper printed their concerns. On 26 September the Army Provost Marshall, Enoch Crowder, citing the ravaging effects the influenza was having on cantonment camps, cancelled the upcoming draft until the flu dissipated. Philadelphia's medical community again tried to cancel the parade pointing out to Krusen

that 1,400 sailors lay hospitalized and if the Army could take such as drastic a step during a time of war, surely Philadelphia should as well. Krusen still refused. He did however, prohibit private organizations from entertaining sailors in the naval yards, although the sailors themselves were free to ride trolleys and attend the theater on their own.¹⁷⁹

On 28 September, well over 200,000 citizens of Philadelphia jammed 23 blocks of the parade route. They had been reassured numerous times the flu did not pose a significant risk. Yet just two days later, Krusen issued a statement admitting the flu was present among civilians and that it was the same dangerous form that had attacked the naval yard and numerous Army camps.¹⁸⁰

The incubation period for the flu generally takes between two and four days. On 1 October 1918, physicians across the city reported 635 cases of influenza. Within a day, Philadelphia was overwhelmed. Doctors were unable to submit accurate reports due to the sheer volume of infections, the shortages of professional assistance, and the amount of paperwork. Some estimates suggest between 50,000 to 75,000 Philadelphians were infected by 3 October. On that same day, Philadelphia shut down all schools and banned public gatherings to include church and amusement parks. Within days, the citizens of Philadelphia began dying at staggering numbers. Between 5 and 26 October, over 8,000 citizens of Philadelphia died from influenza.¹⁸¹

After its onset, the city officials did what they could to respond the epidemic. Immediate concerns included a lack of medical professionals and shortages of ambulances and drivers. Additionally, they erected additional hospitals and morgues and finally cleaned the streets. Food kitchens were established to feed those unable to feed themselves. With the number of cadavers piling up at morgues and hospitals throughout

the city, officials asked for volunteer gravediggers. Eventually, they were forced to offer extremely high wages, but given the risk, the city had little choice. After entire families died, undertakers began refusing service on credit fearing there would be no one left alive to pay the bill. Thus, the city guaranteed payment.¹⁸² Police officers and medical professionals displayed unbelievable selflessness despite tremendous personal risk. Some private citizens and several charities were equally noble. Despite little or no training, they chose to drive ambulances, serve as orderlies, visit victims who were too ill to go to the hospitals, deliver food, and even took in orphans, many of whom were also sick.¹⁸³

Despite these efforts, Philadelphia's leaders were powerless and overwhelmed. They asked the Wilson Administration for assistance, but the federal government was still focused on the war in Europe and maintaining morale on the home front. Neither the state nor federal government provided guidance or assistance. Not even doctors or nurses that were working stateside in a federal capacity were sent to the city in case they might be later needed in Europe.

The measures the city did take either were too late to limit the spread of the disease or could only target second and third effects. The city's leaders had forewarning of a possible disaster, but conflicting interests, corruption, and incompetence all contributed to tragedy. Their time to act was beforehand, yet the decisions they made ultimately made a volatile situation far more disastrous. Over 13,000 citizens of Philadelphia died from the influenza. The city never shifted priority. On 17 October 1918, a day after 711 Philadelphians died, Mr. Jay Cooke, a wealthy city leader publically stated, "it seems few people realize we are facing a serious crisis." One might

assume Cooke was referring to the influenza epidemic, but they would be mistaken.

Cooke was concerned because the city fell behind its quota for selling Liberty Bonds.¹⁸⁴

San Francisco

In contrast to Philadelphia, San Francisco officials handled the crisis as competently as any city in the country. The great earthquake and fire 12 years before had destroyed most the city. In an odd way, this event proved beneficial to the city during the influenza pandemic. Because most of the city had been destroyed, the configuration of housing on the streets was less cramped, its streets were generally clean, and its slums were relatively small. The water and sewer systems, which caused so much frustration during the fire following the earthquake, had been rebuilt to contemporary standards. Another benefit was location. The influenza's second, most deadly wave began on the east coast of the U.S. and moved west thereby giving the city warning.¹⁸⁵ The most significant benefit was the lessons regarding preparedness and planning that it had taught city leaders. Unlike many cities throughout the country, San Francisco leaders did not wait and hope, but acted preemptively.

On 21 September, before doctors had diagnosed a single case, Public Health Director William Hassler quarantined all naval installations, as the flu had consistently struck civilian populations following an outbreak at nearby military installations. He organized ambulance drivers and medical volunteers, established emergency hospitals, coordinated transportation, communication, and supply systems. Additionally, he divided the city into districts and outlined the areas each medical facility would be responsible for. Unlike the information relayed to citizens in many cities throughout the country, San

San Francisco leaders tried to ensure all citizens realized the danger and encouraged local newspapers to report the facts accurately.¹⁸⁶

However, even in San Francisco, the war was the greatest concern. As late as 14 October, the *San Francisco Chronicle* stated, “there is less danger in the Spanish Influenza than in German Peace propaganda.” Within days, doctors diagnosed 4,000 inhabitants with the disease and 130 had already died. That same week Senator Hiram Johnson spoke to a full auditorium at the Civic Auditorium regarding, yet again, war bonds. The event raised over \$370,000, but it would prove to be the last mass gathering in San Francisco for several weeks.¹⁸⁷

Hassler also instituted the wearing of protective masks. On 1 November 1918, the city implemented an ordinance mandating the wear of them whenever in public.¹⁸⁸ While the masks proved to be effective at preventing diseases caused by bacteria, they were far less effective against viral infections.¹⁸⁹ They did provide a barrier against dirt and fluids that might be transporting viruses, but the virus itself is so small, it could easily pass through any cloth no matter how tightly woven or thick. Additionally, masks needed to be laundered daily or they would become contaminated.¹⁹⁰ Nonetheless, hundreds of thousands of masks were issued and the ordinances appeared to be effective. The city instituted ordinances to wear masks twice in 1918, during both the second and third wave. In both instances, the number of new cases began to drop almost immediately. Today’s scientists argue this has to do more with timing than with the masks. They argue the virus was beginning to ebb when the city implemented the ordinances. However, the citizens generally believed the masks were effective.

Eventually enforcement of the mask ordinances became more and more difficult. Besides their questionable effectiveness, they were uncomfortable and hot. People could not eat or smoke with them on. During the fall and early winter, the police in San Francisco arrested thousands of citizens for violating the ordinance. On 8 November alone, they arrested over 400 people.¹⁹¹

This is not to say San Francisco emerged unscathed. During the influenza's peak, San Francisco teetered on the verge of collapse. Like Philadelphia and all other major U.S. cities impacted by the influenza pandemic, it had very few nurses and doctors, saw its hospitals filled with victims, and was unable to provide timely treatment to all the patients. Although the city's resources and systems were stretched to the absolute limit, its public services continued to function, and the number of cases and deaths remained considerably lower than most U.S. cities. By the middle of November, the virus began dissipating. The city had experienced approximately 2,100 deaths and 24,000 cases of influenza. The week of 30 November brought only 57 new cases. This marked the fifth consecutive week of decline.¹⁹² Therefore, on 21 November 1918, San Francisco, believing it had survived the worse, repealed ordinances that mandated the wearing of masks in public, forbid spitting or coughing in public, or outlawed gatherings at churches, schools, or theaters.¹⁹³

This proved to be a mistake. The virus mutated again and a third wave resulted, hitting San Francisco in December of 1918. It was a slight mutation, and compared to the second outbreak, the third wave was relatively minor. Most people struck by the first or second wave were immune to this new strain. Yet while it was far less dangerous than the second wave, people still died. During the week of 18 January 1919, 310 people perished,

and 3,500 new cases were reported. This proved to be the peak of the third wave, but the city leaders feared a full return of the pestilence. On 7 December, Mayor James Rolph, at the urging of Hassler, reinstituted the flu ordinances; however, enforcing compliance proved extremely difficult. The third wave was not stressing San Francisco's public health systems as did the second wave and the citizens had grown tired of the ordinances.¹⁹⁴

Fortunately, the third wave was approximately only half as deadly as the second despite the lack of compliance on the part of San Francisco's citizens. The two waves combined killed 3,500 people and infected 50,000 people. Thus, San Francisco suffered the highest death rate of any city in the west. Nonetheless, it had prepared for and managed the pandemic fairly well. In Philadelphia, a quarter of its population was infected, as were similar numbers across the country. Yet only about ten percent of San Francisco's inhabitants fell ill. Compared to cities of similar size in the east, San Francisco had fought the disease to a draw while most others had lost.¹⁹⁵

The U.S. Government and Military's Role

The Spanish Influenza of 1918 marks perhaps the darkest chapter in the history of the U.S. regarding major disaster response for both the regular Army and the federal government. During the 1906 San Francisco Earthquake, both the Army and the federal government were credited with saving thousands of lives. Yet in 1918, the federal government instituted policy that resulted in the deaths of thousands of Americans. Additionally, although the regular Army possessed the resources, expertise, and personnel for tremendous good, it was ultimately, at least indirectly, responsible for the worst pandemic in the history of the world.

Military and federal leadership argued that every aspect of American society was expected to make sacrifices for the war effort and the medical system was just another example. Yet, the military left the nation unable to handle a domestic emergency. The Army siphoned off so many nurses and physicians that stateside hospitals had to shut down. The doctors remaining in the U.S. when the influenza emerged were either untrained or incompetent.¹⁹⁶ Even after the influenza began to overwhelm communities, the military refused to provide stateside doctors or nurses.

Army Surgeon General Gorgas tried to act swiftly when the second wave began. He created mobile laboratories to identify the cause of the disease and develop a vaccination. He also strongly suggested suspending troop movements until the pandemic passed and instituting strict quarantine procedures. Scores of professionals in addition to Gorgas to include President Wilson's own personal physician, Dr. Cary Grayson, gave the same suggestion.¹⁹⁷ Yet Secretary of War Newton Baker and Army Chief of Staff General Peyton March insisted all precautions were being taken. They further argued that halting deployments to Europe would improve German morale and be disastrous for the Allied cause. March suggested to Wilson that while many Americans and Soldiers were dying of the flu, their sacrifices were just as essential to the war effort as the sacrifices of those killed in action in France.¹⁹⁸

However, this was an exaggeration. Germany began sending peace feelers to the Allies and all its own allies capitulated before the second wave even began. The war ended during the second wave. Thus, the argument of "military necessity" seems weak. Nonetheless, Wilson conceded to the military and shipments and transfers of Soldiers continued thereby further spreading the disease among the military, the country, and the

world. After the war, Secretary Baker realized this policy played a role in the deaths of thousands of Americans and wrote a seven-page apology for his role in the pandemic.¹⁹⁹

Wilson never publically acknowledged the flu's significance. His surgeon general and the head of the U.S. Public Health Service was Dr. Rupert Blue. While Wilson remained inactive, Blue, most likely in an attempt to minimize the flu's effect on "morale," was counterproductive. He blocked funding for research, did not to prepare the nation for the crisis, and refused to collect national or worldwide data that could have been helpful in allocating resources. When city mayors and state governors requested doctors and nurses, he told them none were available or refused to reply. Even after the draft was cancelled, Blue continued to reiterate that there was little cause for alarm. Finally, in late September at the beseeching of military and civilian medical professionals, he requested assistance from Congress. In fairness to Congress, they efficiently provided appropriations when asked. They provided one million dollars to hire 5,000 doctors and nurses and to fight the disease. Blue later returned over \$100,000, as he was unable to locate and hire that many medical professionals. Immediately following the pandemic, Congress allocated additional money to identify the virus, but it was far less than initially requested. Over time, as America moved on from the pandemic and Congress had other priorities, funding ebbed.²⁰⁰

Aftermath

Within two to three decades, the flu pandemic of 1918 was largely erased from America's collective conscious. But scientists did not forget. They studied it for years, trying to determine what caused it and how, if it ever reappeared, it could be destroyed. Before the pandemic, advancements made in germ theory led many virologists to believe

epidemics were controllable with vaccinations and worldwide pandemics were things of the past. Yet despite a herculean effort, an effective inoculation against the 1918 influenza virus could not be developed during the crisis and would not be for another 70 years. Eventually, in 1997, Dr. Jeffery K. Taubenberger of the U.S. Armed Forces Institute of Pathology identified the virus using tissue samples stored by the institute and a complete lung from an Alaskan woman buried in permafrost who was discovered by a retired pathologist named Johan Hultin.²⁰¹

Probably of greater importance were the discoveries made from of trying to identify the virus. Ironically, over time the Influenza Pandemic of 1918 indirectly saved the lives of far more than the 100 million it took. Throughout the 1920s, the most accomplished scientists in the world tried to understand exactly what caused the Spanish Flu. Alexander Fleming, a scientist in England discovered a mold that inhibited the growth of bacteria. He used this mold to kill the bacteria contaminating samples he was using for experiments regarding the 1918 virus. He called this mold “penicillin.” A decade later, two scientists, Howard Florey and Ernst Chain developed penicillin into the antibiotic used today.²⁰² Another scientist who tried to unravel the 1918 virus was Oswald Avery. In 1943, he discovered that an obscure molecule known as Deoxyribonucleic Acid (DNA) carried the genetic information of several viruses from one generation to the next. This discovery essentially opened the field of molecular biology.²⁰³

Besides scientific discoveries, the 1918 pandemic improved medical training throughout the United States. In 1910, just eight years before the pandemic, an internal American Medical Association report concluded that 120 of the 150 medical schools in

Canada and the U.S. were unfit and suggested closing them. Following the pandemic, the Progressive Movement demanded reform. The entire scientific and medical community quickly established new standards in care and medical study. Schools unable to adapt lost their accreditation.

The press failed as well. Instead of serving as a watchdog of American's leaders and policies, during the pandemic the press throughout the country knowingly reported falsehoods and ignored public officials doing the same. These falsehoods, instead of minimizing the fear, exasperated it. Citizens throughout the country read and heard from their leaders and the news media that the flu was not dangerous, that it was under control, or that it had peaked. Yet they saw the flu decimating their communities, their neighbors dying, and the government unable to manage the disaster. This led to a loss of confidence in the press and local, state, and national leaders.

There were consequences for this loss in faith. Although many private citizens displayed tremendous courage, the fear resulting from simply not knowing the truth, caused many citizens to abandon each other. People refused to help a sick neighbor, a mother would not feed her children, and medical professionals would not tend to the sick. As a result, many victims, who might have lived had they received a modicum of medical assistance, simply withered away.

Long Term Effects on Public Policy

While federal guidelines soon included influenza epidemics as reportable, some historians suggest that there were few changes in policy resulting from the influenza of 1918. Empirical data does not necessarily support that belief.

These advancements in science and improvements in practice had a profound effect on life expectancy among Americans. An example of this can be seen in U.S. Soldiers during World War II. Until World War I, deaths due to disease within the U.S. military steadily declined during every major conflict since the Mexican-American War. The improvements were actually quite remarkable. During the Mexican-American War, which was fought from 1846 until 1848, over ten percent of all deaths resulted from disease. By the Philippine Insurrection, approximately 25 years before World War I, less than 13 of every 1,000 Soldiers died of disease. In World War I, however, that number rose to over 16. While scientists were still unable to ascertain the cause of the pandemic during the inter-war period, their research spawned numerous vaccinations. When the U.S. entered World War II, its military was the most vaccinated in the history of armed conflict. Only six of every 10,000 Soldiers died of disease during that conflict.²⁰⁴

An additional long-term effect on public policy is the use of Nonpharmaceutical Interventions (NPIs). NPIs are public policy tools designed to alter the behavior of a population and limit the exposure of individuals. Examples of NPIs include quarantine, banning social gatherings such as church or funerals, isolation, and covering your mouth when you sneeze or cough. Several cities throughout the country implemented NPIs in 1918. Recently, Howard Markel of the University of Michigan published a study of the policies imposed by 43 cities during the influenza. He concluded that the cities that utilized NPIs lessened mortality rates. John Barry questioned the thoroughness of some of Markel's research, specifically doubting that New York or Chicago implemented NPIs as Markel contended. Dr. Barry is not familiar with the other 41 cities nor does he argue that NPIs may not be effective. He simply points out that Markel's research is flawed.

Nonetheless, San Francisco certainly utilized NPIs and the influenza's impact on the city was comparably minimal. Surgeon General of the Army Gorgas, who saw virtually all his recommendations ignored during the crisis, was able to impose quarantine on all returning Soldiers following World War I. Although not referred to as an NPI at the time, this measure prevented returning Soldiers from spreading further diseases as had occurred following every prior U.S. war.²⁰⁵

One final long lasting effect on public policy is a concern that the virus could return. Soon after the pandemic passed, Surgeon General Blue stated, "Communities should make plans now for dealing with a possible reoccurrence, to sum it in a single word, "preparedness." And now is the time to prepare." Dr. Taubenberger reinforced the possibility of another pandemic in a 1998 interview, highlighting that influenza pandemics are common in world history, occurring every 20 to 30 years. He believes the likelihood of another pandemic occurring is 100 percent and further pointed out the last significant pandemic was in 1968, so in essence, the world is overdue.²⁰⁶ Every pandemic or epidemic since 1918, to include the 1957 H2N2 Asian Flu and the 1968 H3N2 Hong Kong Flu, both of which claimed over a million lives each, can be traced to that virus.²⁰⁷ As humans travel farther, faster and are in greater contact with each other, the chances of a viral mutation taking hold increases. Therefore, as seen by the U.S. government's preparedness concerning the current H1N1 outbreak, societies must remain far more proactive regarding influenza policy.

In addition to being proactive, governments must also ensure their policies are well thought out before the crisis. This lesson was learned in 1976 after two Soldiers at Fort Dix, New Jersey appeared have been infected with the 1918 virus, and a panel of

experts warned President Gerald Ford that another outbreak was very possible. Deciding to be proactive, he instituted a massive influenza vaccination program to inoculate the entire country. However, the National Swine Flu Immunization program, as it was known, was not well developed beforehand and proved to have serious flaws. The first was that the vaccination could not have defeated the 1918 virus to begin with. Nonetheless, Congress appropriated \$135 million and even took the remarkable step of insuring drug companies against civil liability if the quickly developed and untested vaccination caused any unintended side effects.²⁰⁸ While the influenza never materialized, the vaccination was blamed for increased occurrence in Guillan-Barre syndrome, a rare, usually reversible disease that causes paralysis or death in ten percent of its victims. Additionally, it was blamed for causing multiple sclerosis, arthritis, fainting spells, and unexpected death in several people. Over 40 million Americans received the shot. In a sample that large, it was hard to determine if the vaccination was to blame, or if it was coincidence. Scientists remain divided to this day. Nonetheless, by 1980, the U.S. government settled close to 4,000 claims seeking \$2.3 billion in damages.²⁰⁹

The 1927 Mississippi Flood

What Happened?

The Mississippi River

The Mississippi River is the second longest river in North America. Its northernmost source is Lake Itasca in northwest Minnesota. From there, it flows south for close to 2,000 miles before entering the Gulf of Mexico. The river connects several of the country's major sources of commerce to include St Louis, Memphis, and New Orleans.

The Mississippi and its tributaries, among which include the Ohio, Arkansas, Red, Illinois, Wisconsin, and Minnesota Rivers, create a watershed known as the Mississippi River Basin.²¹⁰

At 1,244,000 square miles, the basin is one the world's largest watersheds. From Montana to New York and New Mexico to North Carolina, it incorporates part or all of 31 states.²¹¹ The Upper Mississippi River begins at St. Anthony Falls, Minnesota and flows south 900 miles to Cairo, Illinois. Cairo marks the beginning of the Lower Mississippi River, which continues south approximately 1,000 miles to the Gulf of Mexico.²¹² Over 40 percent of the rainfall and snowmelt in the continental U.S. funnels into the Gulf through the Lower Mississippi River.²¹³

Excessive precipitation in either the Upper Mississippi or the river's tributaries historically results in flooding in the Lower Mississippi. The city of New Orleans and the Mississippi Delta, the area along the river between Vicksburg, Mississippi and Memphis, Tennessee, are especially vulnerable. The Mississippi Delta, not to be confused with the mouth of the river approximately 300 miles to the south, includes Washington County and Greenville, Mississippi.²¹⁴ Known as the "Queen of the South" in 1927, Greenville was a prosperous community well known for large cotton farms, wealthy landowners, and poor African American laborers. Greenville was also home to the powerful former U.S. Senator and landowner, LeRoy Percy and his son Will.

Flooding occurred with some regularity along the Mississippi in the late 19th and early 20th centuries. Examples include 1890, 1897, 1903, 1912, 1913, and 1922.²¹⁵ Well before the American Revolution, local communities began erecting a series of earthen walls along the river known as levees to protect themselves.²¹⁶ By 1927, levees had been

part of life along the Mississippi River for generations. Irish immigrants built the first levees in Greenville with wheelbarrows. They were approximately four feet high and failed often. Nonetheless, they generally protected the cotton fields and thereby the economic and social interests of the landowners, planters, and farmers.²¹⁷

Congress established the Mississippi River Commission (MRC) in 1879 to partner with the U.S. Army Corps of Engineers (USACE) for the purpose of controlling flooding along the Lower Mississippi River. By 1927, the levees, now built with caterpillars, were up to 40 feet high and existed along both sides of the river from Cairo, Illinois to the Gulf of Mexico.²¹⁸ Usually erected approximately a mile from the natural banks of the Mississippi River, they were massive earth works built three feet higher than the 1882 flood level, which was the highest water level the Mississippi had ever reached.²¹⁹

The MRC and USACE considered several additional flood control methods to augment the levees. One idea was to dig reservoirs along the Mississippi's tributaries, specifically, the Missouri and Ohio Rivers. This would prevent massive amounts of water rushing into the river at the same time.²²⁰ Additionally, they planned to construct outlets that would divert some of the river's water if the level became too high. Two primary candidates for outlets were the Atchafalaya River, which would carry the excess waters directly into the Gulf and Bonne Carre, north of New Orleans, which would deliver the waters into Lake Pontchartrain.²²¹

Despite these initiatives, James Buchanan Eads, the preeminent engineer of his time and a Mississippi River expert, argued the levees, even augmented with outlets, would ultimately fail. He strongly advocated including cutoffs into the flood control strategy. Cutoffs would straighten the river at S-curves, thereby increasing the speed of

the river and eliminating areas where the river would exert greatest pressure on the banks. Additionally, as the speed of the river increases, it would pick up sediment along the bottom, thereby making the bed lower. This would allow the Mississippi to accept more water without flooding.²²²

By combining levees, reservoirs, outlets, and cutoff, the MRC and USACE could have created a comprehensive approach to flood mitigation and prevention. However, these additional techniques involved significant cost in construction and maintenance, would have taken more time to complete, and would have forced the federal government to confiscate lands belonging to private citizens, all of which was politically unpalatable. Therefore, in 1927, the government relied solely on levees to prevent flooding.²²³

As the levees grew stronger throughout the first decades of the 20th century, an unanticipated phenomenon emerged. Early levees were smaller and the Mississippi River only had to rise three to five feet before they failed. The water that either crested the levees or drove through breaks flowed into the afflicted area relatively slowly. By 1927, however, the levees had grown to such strength and height that massive amounts of water and tremendous pressure had to build up before they would fail. As a result, when the levees did fail, the resulting crash of water caused tremendous damage. Will Percy explains, the rushing water was, “so swift, so deep . . . it scours the top soil from the fields, destroys everything in its path . . . and scatters death among the humble.” Percy observed that when the Mississippi flooded before the large levee system, it would normally recede quickly, within two to three weeks. After the USACE built the levees, when the river flooded, the floodwaters stayed so long they would prevent crop planting for the year.²²⁴

Communities soon realized if a levee failed on the other side of the river, the water pressure on their side would be relieved and therefore spare their town. Thus, municipalities became fearful of outsiders trying to destroy their levees. In response, towns all along the river established patrols to protect their section of the levee. While confirmed reports of guards shooting saboteurs are virtually nonexistent, the tradition of “walking the levee” preformed an important secondary task. During the endless patrolling, guardsmen identified weak spots, under seepage, or small geysers known as “boils.” Once identified, the USACE or local citizens could repair the levees before a crevasse, or major break, emerged depending on whether they were local or federal levees.²²⁵

The Weather in 1926 and 1927

Heavy rains began saturating much of the Upper Midwest in August of 1926. The storms inundated an area from South Dakota to Oklahoma and then moved into Iowa and Missouri. The tempests crossed the Mississippi River and then drenched Illinois, Indiana, Kentucky, and Ohio. While rain is common in these parts of the country during that time of year, the amount of rain and consistency of storms was unusual. By October, the Lower Mississippi River exceeded 40 feet on the Vicksburg gauge. Only six previous times had the Mississippi topped 30 feet in October. In all six cases, the following spring brought massive flooding. Of greater concern for individuals living along the Lower Mississippi were the readings along the Ohio and Missouri Rivers. During the last three months of 1926, the average readings for every single gauge along those rivers were the highest on record for that time of year. A new series of storms brought more rain in December.²²⁶

Dr Isaac Cline, the head meteorologist during the Galveston Hurricane, was the Chief Weather Forecaster for New Orleans in 1927. He realized all the excess water in the tributaries would eventually enter the Mississippi. On New Year's Day 1927, the Mississippi River exceeded flood stage at Cairo, Illinois. This marked the earliest time of year on record the river had done so. Thus, according to Dr. Cline conditions along the river on 1 January 1927 strongly indicated severe flooding for the Lower Mississippi in 1927.²²⁷

Entering January 1927, the levees were already at a disadvantage. Heavy logging along the river combined with improper contour plowing by farmers allowed a higher percentage of rainwater to enter the Mississippi quicker than engineers anticipated when they designed and built the levees.²²⁸ Additionally, in previous years, the river receded in the late summer and fall. The usually low water levels and mild weather allowed the USACE to conduct maintenance. However, the high water and endless storms in late 1926 not only saturated and weakened the levees; they also prevented repairs.²²⁹ Despite these concerns, the USACE remained confident. General Edgar Jadwin, the Chief of the USACE, predicted in his annual report to Congress, the levees would be strong enough to “prevent the destructive effects of floods.”²³⁰

The New Year continued to bring more precipitation. In January 1927, the Cumberland, Ohio, Illinois, St Francis, Arkansas, and Missouri Rivers all flooded. In February, several levees along the Mississippi River's tributaries failed. Most noticeably, levee breaches along the White and Little Red Rivers flooded over 100,000 acres in Arkansas with ten feet of water.²³¹

As the Mississippi rose, its tributaries backed up. In January, a storm flooded Pittsburg, PA. Its flood surge reached New Orleans in 29 days. Five weeks later, the city flooded again. This time, it took 38 days for the floodwaters to pass New Orleans. This indicated that the Mississippi was losing its ability to store additional water²³² and was of significant concern to engineers. If the river stopped accepting water, the tributaries would overflow their levees, thereby causing significant flooding throughout the country.

By the middle of March, the water and pressure along in the Lower Mississippi was beyond the design capacity of the levees. On 25 March, the gauge in Cairo, Illinois reached the highest levels ever.²³³ Continued rain destabilized the levees. Additionally, gale force winds created large waves that pounded and further weakened them. Under seepage and boils became prevalent all along the Lower Mississippi.²³⁴ Dr Cline recalled, “Flood conditions in the central Mississippi Valley had assumed such serious proportions by the middle of April that a dangerous flood was certain to occur in the Lower Mississippi Valley, and that great destruction and loss of life would result. . . .”²³⁵

To save their towns, powerful landowners and local officials pressed African Americans into service on the levees, often at gunpoint. In Washington County alone, the work gangs encompassed over 30,000 individuals.²³⁶ The African Americans stacked sandbags 24 hours a day to strengthen the dikes and increase their heights. In Greenville, Charlie Williams, an employee of LeRoy Percy and an “expert flood fighter,” established camps complete with field kitchens and tents for thousands. They ensured the labors never left the levees and later they served as refugee camps.²³⁷ Forcing African Americans to work on the levees whenever the Mississippi threatened to flood was a common practice along the Delta. During a previous flood in 1912, the *New York Times*

complemented a “brilliant” engineer who was overseeing work on a vulnerable levee. Upon realizing that the crew had filled and stacked all the available sandbags, the engineer ordered hundreds of African Americans to lie on top of the levees and each other to prevent the water from cresting the dikes.²³⁸

Throughout the spring of 1927, the USACE continued to reassure a concerned public that the levees would hold. As late as 9 April, Major Donald Connelly the commander of the MRC’s Memphis District, boasted, “We are in condition to hold all the water in sight.” Nonetheless, the situation on the Mississippi and its tributaries grew more dire by the day and the confidence of the Corps less assuring.²³⁹

In early April, ceaseless rains caused flooding in Oklahoma, Missouri, and Kansas. Several of the Mississippi’s tributaries, the Ohio, Missouri, Canadian, Red, Black, and Arkansas Rivers also flooded. More than one million acres of land was under water to include Pittsburgh, Cincinnati and parts of Oklahoma City. Floods had already produced 50,000 refugees, mostly from the tributaries.²⁴⁰ Local and state leaders asked President Calvin Coolidge for assistance. However, federal policy regarding disaster response remained essentially the same as it had been in 1900. These were local issues, and the federal government was hesitant to intervene.

The catalyst for the paradigm shift occurred on 15 April 1927, when another large storm dumped from six to 15 inches of rain along the entire Lower Mississippi in an 18-hour period. This storm was a deathblow to the “levees only” policy along the Lower Mississippi. The following day, the first federal levee failed at Dorena, Missouri, inundating 175,000 acres. Three days later, another levee failed in New Madrid, Missouri, flooding an additional one million acres.²⁴¹

African American crews continued to work day and night on the levees. They received little or no pay, and as the levees became unstable, the work environment grew very dangerous. At Mounds Landing, Mississippi, the National Guard Commander forced African Americans to continue filling sandbags at gunpoint well after the failure of the levee was assured. While the guardsmen evacuated the levee before it eventually failed, they left much of the crew behind. On 21 April 1927, the levee finally broke and the rushing water swept up to 100 men to their deaths.²⁴²

The Flood

The Mounds Landing break sent a torrent of water three quarters of a mile across and 100 feet high into the Delta. The volume of water that passed through the breach exceeded all the water in the Upper Mississippi or in the Niagara Falls. Its force created a gouge in the earth 100 feet deep and a half a mile long. At 12:30 p.m. on 21 April 1927, Major John Lee, the Army Engineer for the District in Vicksburg, wired Jadwin stating, "Levee broke at ferry landing Mounds Mississippi 8:00 a.m.. Crevasse will overflow entire Mississippi Delta."²⁴³ His assessment proved correct.

The levee failure sealed the fate of Greenville, only 12 miles south of Mounds Landing.. Within 36 hours, the flooded area ran 90 miles west and 50 miles south of the levee break. Over 185,000 inhabitants were under as much as 30 feet of water and as Will Percy predicted, the flood did not recede for four months.²⁴⁴

Amazingly, the Mississippi Water Basin funneled the water from the Dorena, New Madrid, and Mounds Landing crevasses back into the Mississippi River near Vicksburg. Over the next several weeks, the high waters continued south, toppling more

levees. By the middle of May, 17 levees along the Mississippi failed. As feared, the tributaries soon backed up causing an additional 209 levee breaches.²⁴⁵

Within weeks, the Great Mississippi Flood of 1927 inundated seven states. Mississippi, Arkansas, and Louisiana were the most severely affected. The entire Mississippi Delta, five million acres in Arkansas, and another six million acres in Louisiana were all under water. Throughout the country, the flood consumed 16,570,627 acres of land, flooded 162,017 homes, and cause over \$100 million in crop damage.²⁴⁶ The flooded area was equal to the combined size of Massachusetts, Connecticut, Vermont, and New Hampshire.²⁴⁷

As was evident during the 1900 Galveston Hurricane and the 1918 Influenza Pandemic, the press performed its function of relaying vital information to the public poorly. Dr Cline states in his autobiography that the U.S. Weather Bureau believed by the end of 1926 that 1927 would bring significant flooding. In April, the bureau warned that serious flooding on the Lower Mississippi was imminent. However, the newspapers did not publish the warnings. When Cline contacted the papers, he was told the merchants of New Orleans formed a censorship committee and that committee suppressed the bureau's warning because it was concerned they would force the citizens to flee and prevent outside businessmen from visiting or investing.²⁴⁸

On 21 April 1927, the levee break in Mounds Landing demonstrated the danger to everyone living in the Lower Mississippi region. The inhabitants in New Orleans were in a panic. They were also furious with the newspapers for failing to warn them. In response, the papers denied the accusations. On 22 April, the *Tribune* printed, "Rumors! A rumor was circulated throughout the city that the newspapers of the city were not

revealing the entire truth regarding the river and levee conditions; that news was being withheld from the public, that news was being censored. There is no truth in them of course.” The *Times-Picayune* concurred, telling the city there was no need to be alarmed by the “hundreds of false reports” circulating throughout the city.²⁴⁹

U.S. Government’s Role

The Great Mississippi Flood of 1927 marks the first time the federal government provided significant resources, personnel, and policy oversight to coordinate response operations following a major natural disaster. Primarily, the executive branch controlled the response. On 22 April 1927, the day after the Mounds Landing break, President Coolidge established a quasi-governmental commission, known as the Mississippi Flood Committee, which included several federal departments along with the Red Cross and private citizens. Coolidge assigned the Secretary of Commerce, Herbert Hoover to head the commission. The president delegated all authority relating to the flood response to Hoover. This empowered Hoover to execute Coolidge’s intent expeditiously and innovatively while preventing confusion as to who was in charge.²⁵⁰

Hoover was an astute choice. He was as an ably skilled administrator who proved himself during World War I as the European Relief Administrator and later as President Wilson’s Chief of Food Administration.²⁵¹ Hoover’s leadership ability was rooted in his organization skills. Personally, a shy and quiet man, the appointment was widely commended.²⁵² The *St Louis Post* commented, “The dynamic capacity for organization Mr. Hoover demonstrated in the service which made him an international figure will find a field here for effective operations.”²⁵³

Hoover headquartered the Mississippi Flood Committee in Memphis. The organization included elements from the Departments of the Navy, War, Treasury, Coast Guard, Agricultural, and Commerce along with state representatives, private agencies, and the Red Cross. The headquarters synchronized efforts with the regional offices located throughout the flooded area. The regional offices received requests for assistance or resources from affected community relief organizations, and passed on the requests to the headquarters. The Memphis office acquired the needed assets or capabilities by coordinating with the various involved federal agencies and allocated the assets to the regional offices, expecting them to distribute the supplies properly to the local communities.²⁵⁴ Initially, the commission's primary focus was aiding the refugees, then the target shifted to helping communities rebuild. Hoover's commission provided assets, funding, and the technical expertise for the towns to rebuild businesses, schools, roads, and bridges. Finally, they provided supplies to help individuals get back on their feet such as farm tools, clothing, and seed.

Hoover wanted the recovery to remain essentially a grassroots effort. Therefore, while the Mississippi Flood Commission provided local communities with assets and capabilities, it did not directly oversee the response operations at the local level. Several years later, while describing the flood, Hoover stated, "Those were the days when citizens expected to take care of one another in time of disaster and it had not occurred to them that the Federal Government should do it."²⁵⁵

Under Hoover's leadership, the committee requested all able Americans to donate to the relief effort. This raised approximately \$17,500,000 in private contributions and another \$6,100,000 from state and federal governments and the railroad industry.²⁵⁶

Additionally, the Hoover commission reestablished a viable credit base. The flood destroyed the 1927 crop, most of the farm animals, and much of the farms' equipment. Therefore, many farmers feared financial ruin. Under the Hoover commission, state reconstruction entities lent money to farmers, and then sold the loans to the federal government. With the proceeds, the local banks were able to establish more loans.²⁵⁷ Most important, Hoover put a federal face on the response effort and portrayed confident and competent leadership. While mayors and governors requested Coolidge to visit the flooded region, he continually declined. Given his failure to establish a federal response before the Mounds Landing breach and now his refusal to visit the victims, Coolidge lost credibility as a national leader. Hoover on the other hand, through a carefully crafted media campaign, seemed omnipresent. He posed for photographs, attended the births of babies, gave the first nationwide radio address, and met with local and state officials. Throughout the crisis, Hoover appeared to much of the nation as a heroic and effective leader²⁵⁸

This is not to say Hoover was free from criticism. Many local leaders felt he micromanaged their efforts by dictating technicalities, such as the size of the camps, and the construction standards of tent platforms, latrines, pipelines, and wells. The greatest concern however, was the lack of federal oversight.²⁵⁹

The flood impacted approximately 600,000 people in Mississippi, Arkansas, and Louisiana. Slightly less than half of them lived in the upper levels of their houses or relocated to the homes of friends and family members. The other 307,000 people however required rescue and relocation. Throughout the Mississippi Valley, the Red Cross and the Mississippi Relief Commissions established 154 camps, with 129 in the

three most effected states.²⁶⁰ At their best, the “tent cities” were uncomfortable. As James L. Fiester, a Red Cross official and Hoover commission leader pointed out, most the inhabitants were, “rural folk, not experienced in the nuances of high density living.” There was no infrastructure and no prior existing ordinances or municipal law. Hoover’s commission, however, intended them to be safe, and the vast majority provided refugees with food, water, shelter, drainage, policing, lights, and sanitation.²⁶¹

However, this was the deep south in the 1920s and therefore, the experiences of the whites impacted by the flood were significantly different from the African Americans. While most white people were safely ferried to camps established outside the flood zone, African Americans remained in the flooded areas, living in camps established on the levees themselves. Often African Americans were subject to mistreatment. Nowhere was this more apparent than in Greenville, Mississippi, where a combination of racism and lack of federal oversight resulted in blatant abuse.

On 22 April, LeRoy Percy assigned his son, Will, to lead the Greenville Relief Commission. As Will Percy explained, his first dilemma “was essentially a choice between mass feeding and evacuation. For the whites, we chose evacuation.” As for the African American refugees, Percy was not sure. There was little clothing or food for the 7,500 people, and the weather was unseasonably cold. Eventually, Will determined he could not provide an adequate facility for the refugees in Greenville and therefore the only honorable course of action was to evacuate them as well. He coordinated with the Red Cross to establish a camp at Vicksburg and furnish two barges to transport them there.²⁶²

The landowners strongly opposed his plan. The life of African Americans in Greenville was especially hard, even before the flood. The sharecropping system imprisoned them to a life of poverty, endless manual labor, and unparalleled discrimination. The landowners knew this, and realized that if their labor force left Greenville, many would never return. They conspired with Will's powerful father to keep the African Americans in Greenville. Although Will protested, when the barges arrived as he had coordinated, only 33 white women and children boarded.²⁶³ The African Americans were forced to remain in a seven-mile long camp on top of the levee.²⁶⁴

To justify forcing the African American to remain on the levee, LeRoy Percy persuaded the Red Cross to make Greenville a distribution center.²⁶⁵ Throughout the crisis, African Americans in Greenville unloaded 180,000 pounds of rations for people and animals. Yet because they were technically assisting the Red Cross, they were considered unpaid volunteers.²⁶⁶ The town issued those who agreed to work nametags that stated, "Laborer." Refugees without a tag did not receive rations. The situation reached a boiling point after the floods receded and the town again conscripted the African Americans to remove the mud from the community. Eventually many refused to work. Hoover himself even visited Greenville to encourage the African Americans to return to work, but his visit was a failure. On 7 July, a local police officer shot and killed James Gooden a respected African American for refusing to work.²⁶⁷ In response Will Percy convened a reconciliation meeting at a local church, but the meeting was one sided. Percy blamed the workers for the death of Gooden and scolded them for their, "laziness."²⁶⁸

Living conditions in the refugee camps in Greenville were equally oppressive. The National Guard patrolled the camps and did not allow workers to leave without permission. Reports of the guardsmen stealing, raping, or beating the African Americans on the levee was common. Local police patrolled the Illinois Central Railroad stations and any African Americans caught at the depots were returned to the levees. Food was also inferior. Greenville's leaders, refused to distribute the high quality rations to the refugees fearing doing so "would simply teach them a lot of expensive habits" or "spoil them."²⁶⁹

Other reports of abuse emerged. By June, the Red Cross and the Flood Relief Commission began providing the refugees food, clothing, money, and farm supplies so they could return to their homes.²⁷⁰ However, the supplies were not directly issued to the refugees. Instead, the Red Cross and Hoover Commission distributed the supplies to the landowners, who charged the workers on credit for the essentials. As a result, many African Americans were deeper in debt after the flood than they were beforehand.²⁷¹

Aftermath

Greenville was not the only scene of abuse and discrimination. After the failure at Mounds Landing, the business elite of New Orleans feared the city would flood. Although reassured by Dr. Isaac Cline that the city would be spared, they conspired with Louisiana Governor, Oramel Simpson to destroy the Pydras Levee 14 miles south of the city. After the levee failed, the water surrounding the city would flow into the fabricated spillway, much like water draining out of a bathtub. The only issue was that the area they intended to flood included the Plaquemines and St Bernard Parishes, home to 10,000 poor farmers and trappers. Nonetheless, they approved the plan, despite the concerns of

the inhabitants in the parishes. On 29 April, the city began demolishing the Pydras Levee. It took ten days, and 39 tons of dynamite to breach the levee. The resulting crevasse worked exactly as planned. It released 250,000 cubic feet of water per second into the doomed parishes. However, as Dr. Cline predicted, several levees north of the city failed the following day. Even if the businessmen had not destroyed the Pydras Levee, the city would have been safe from the flood.²⁷²

Although the governor mandated fair compensation and the business leaders promised it to the residents beforehand, of the \$35 million worth of claims filed, the city only paid \$2.9 million. The average inhabitant of Plaquemines and St Bernard Parishes received less than \$300 in compensation for losing their home and livelihood. Over 1,000 inhabitants received no compensation at all. The city even deducted housing and food costs from people who lived in a city-owned warehouse after their homes were flooded.²⁷³

Hoover was aware of these reports of abuse, but managed to keep his distance from them. Criticism of the federal government focused on why it waited until the Mounds Landing breach before providing assistance and why it refused to provide federal funds despite a \$20 million budget surplus. Critics questioned Coolidge and not Hoover. When the waters from the Great Flood of 1927 receded in August, along with the massive damage, the flood changed the political landscape of the U.S. Some historians, such as Steve Ambrose, argue that Herbert Hoover failed to alleviate suffering among the flood's victims and took advantage of the disaster to further his political ambitions.²⁷⁴ Most however, disagree. Hoover received national acclaim for his efforts from a friendly press, and the "great humanitarian," as he became known, pole-vaulted from non-contender in

early 1927 to the Republican Nominee and President in 1928.²⁷⁵ The same year, Huey Long, a populist Democrat, propelled by the disillusioned citizens of New Orleans' flooded parishes, became governor of Louisiana, replacing Oramel Simpson.²⁷⁶

One can argue that the seeds of the civil rights movement were sown during the 1927 Flood. Although the planters conspired to keep their labor pool in the Mississippi Delta, the African Americans were disillusioned by the long-standing racist traditions, the sharecropping system, and the treatment they received during the flood. By late summer, thousands began migrating north. Within a year, Washington County lost 50 percent of its labor pool. Once very prosperous, both Greenville and its wealthy cotton farm owners never recovered.²⁷⁷

In response to reports of mistreatment of African Americans in some of the relief camps, Hoover established a "Colored Advisory Commission." He appointed Robert R. Moton, the president of the Tuskegee Institute to preside over the investigation.²⁷⁸ The report substantiated the claims of African Americans who lived in relief camps along the Mississippi Delta. It concluded that the National Guard and local leaders abused, raped, stole from, and murdered numerous African Americans. However, Hoover was worried the report would damage his reputation and cost him his presidential bid. He asked Moton to suppress the report and promised to make race relations a priority of his administration if he won the election. Although the Colored Advisory Commission suppressed the report, Hoover turned his back on the organization following his inauguration. In 1932, Moton and his organization were disenchanted with the Republican Party, shifted their allegiance to Franklin D. Roosevelt and the Democrats.²⁷⁹

Long Term Effects on Public Policy

The Great Flood of 1927 influenced long-term public policy in two aspects. First, it forced Congress, the MRC, and the USACE to reevaluate its flood control plan for the Lower Mississippi River. After much debate, Congress passed the sweeping Flood Control Act of 1928, which abandoned the levees only policy. Developed by MG Edgar Jadwin, the Chief of the USACE, the plan was a comprehensive system that incorporated reservoirs, spillways, cutoffs, and floodways to augment the levees.²⁸⁰ Congress has amended the plan and the USACE has made numerous upgrades as technology developed over the past eighty years. Nonetheless, the layered defense strategy depicted in the statute has fundamentally remained the same.

Secondly, the Mississippi Flood represents a departure point regarding how the U.S. federal government responds to natural disasters. Following reconstruction, the federal government was hesitant to get involved with what it believed to be local or state issues. Local and state leaders were equally uncomfortable with federal involvement. During the 1870s through the 1880s, a political philosophy known as “Laissez Faire Government” dominated the political thinking of the nation’s leadership. Although primarily focused on industry, followers of laissez faire believed the federal government should remain small and stay out of the affairs of individuals, states, and private businesses. This system allowed the very wealthy to grow incredibly powerful while the lower classes fell deeper into poverty. The Progressive Movement, which emerged in response to Laissez Faire Government, demanded that government place controls on industry, business and the economy to ensure the lower classes have more opportunity. By 1927, the federal government had begun regulating businesses and industry; however,

the laissez faire philosophy continued to influence policy. This is evident in the national policy for responding to major natural disasters.

The 1927 Mississippi Flood revealed the weakness in this thinking. It highlighted that during major natural disasters, only the federal government possessed the assets, capabilities, and administrative functions needed to coordinate response operations effectively. While local and state leaders must remain capable to respond to most disasters, the federal government should be prepared to assist when needed and should develop policies and procedures for providing that assistance. This belief eventually led to the creation of FEMA and national response planning and became a cornerstone of current natural disaster response doctrine. Additionally, some of the fundamental administrative methods implemented by Hoover continue to this day as well. From his headquarters in Memphis, he collocated the federal agencies, private corporations, and NGOs necessary to coordinate response, provide assets, and furnish capabilities to local governments based off their needs. In current terminology, Hoover's headquarters was a Joint Field Office (JFO), and like in 1927, a JFO is a key element of response doctrine.

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⁴⁶Cline, 93-96.

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⁴⁸Cline, 96.

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- ⁶³Weems, 140-146.
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CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Over the 27 years from the Galveston Hurricane in 1900 until the Mississippi Flood of 1927, U.S. policy for responding to major natural disasters evolved significantly. Before the dawn of the 20th century, the federal government essentially left natural disaster response to local and state officials as the McKinley Administration displayed following the Galveston Hurricane. The first time the federal government allocated substantial resources in response to a major natural disaster was San Francisco in 1906; however, the response was not due to a policy change, but rather was due to the large U.S. Army presence already in the area. The 1918 pandemic frustrated federal and Army leaders and revealed the dangers of not having established policies prior to a major natural disaster. The Mississippi Flood in 1927 marked a departure point from laissez faire federal leadership following major natural disasters. While officials committed numerous errors specifically regarding the timeliness of the response and the lack of federal oversight at the local level, 1927 was the first time the federal government oversaw both policy and resource allocation. It also set a precedent. Following the flood, Americans expected the federal government and their elected officials to provide leadership following major natural disasters. These four events remain relevant today. They highlight several lessons that individuals, municipalities, tribes, states, the federal government, and the regular U.S. Army must incorporate into current response policy.

Conclusions

Local, Tribal, and State Policies

All four of these incidents highlight the importance of planning at the local, tribal, and state level. Local agencies will have the greatest impact on response operations, as they will be the first to respond to an incident and the last ones to leave. Additionally, they should develop internal capacities and policies while realizing that federal plans and assets, to include the Army, cannot overcome local failures. Negative examples of this point include Galveston's failure to build a sea wall despite previous hurricanes, Philadelphia's policies regarding the influenza pandemic, and San Francisco allowing its water cisterns to deteriorate despite the warnings of its fire chief. On the other hand, San Francisco's response to the influenza threat and the establishment of a new city government by the citizens of Galveston in 1900 following the disaster serve as positive examples.

This concept is captured in current natural disaster response strategy. One of the basic premises of both the NIMS and NRF is that incidents should be managed at the lowest level possible. Therefore, national policy is designed to ensure local municipalities retain authority over the response activities in their jurisdictional areas. However, many local, tribal and state governments do not appreciate this responsibility and remain overly reliant on the federal government. As a result, they place unnecessary burdens and unrealistic expectations upon the federal government and the regular U.S. Army. As LTG Russel L. Honoré observed, "There is an expectation in many states...that if something is broken, the federal government will come and fix it. . . . In real life, there is no way to

have a disaster in the morning and have everything back to normal by the next morning.”¹

Culture of Preparedness

Preparedness requires individuals, leaders, and communities to accept that regardless of state-of-the-art technology and vastly improved scientific prediction capabilities, natural disasters happen and that they can affect anybody, at any place, and at any time. In the last 20 years, the technological solutions implemented following all four of the disasters discussed in this thesis to prevent similar catastrophes from reoccurring have failed. The Galveston seawall could not prevent Hurricane Ike from ravaging the island in 2008. In 1989, fires sparked by a large earthquake nearly grew into another conflagration in San Francisco. Despite the medical breakthroughs in the last 90 years, the virus that causes Acquired Immune Deficiency Syndrome has killed millions, and the H1N1 strain again threatens the country. Finally, the levees along the Mississippi failed to protect the citizens in New Orleans following Hurricane Katrina or in Illinois during the 1993 flood. Along with this realization, preparedness requires individuals, leaders, and governments to develop plans and capabilities that ensure the maximum number of people within their scope of responsibility survive major natural disasters.

As Surgeon General Blue pointed out shortly following the 1918 Influenza Pandemic, a “Culture of Preparedness” is not a new concept. The NRF and NIMs both emphasize preparedness at all levels. However, preparedness involves many aspects. It requires solid planning well beforehand. The 1976 immunization program instituted under the Ford Administration highlight that haphazard or poorly conceived plans that do not assess risk might ultimately prove counterproductive. Additionally, capacity

development, which is another essential aspect of preparedness, requires prior training. For example, the demolition missions conducted by the San Francisco Fire Department and U.S. Army during the 1906 fire illustrate the consequences of believing capacity exists without conducting prior training.

Preparedness is also an individual responsibility. It requires a willingness to act when given the correct information. As Honoré discusses, “People need to see first, understand first, and act first.”² The 12 Soldiers in the Fort Crockett barracks during the Galveston Hurricane had the information necessary to save their lives. Yet, they were afraid to act and as a result, seven of them perished. Honoré continues, “As much as government and the business community are responsible for helping create this culture of preparedness, individuals must share a significant amount of the responsibility for getting themselves, their families, and their homes in a position to survive the next disaster.”³

Finally, the most unfortunate of our society, the poor, the sick, and the elderly suffer the greatest during natural disasters. While this is evident in all four incidents studied in this thesis, the 1927 Mississippi Flood serves as the most disturbing example. Such individuals are the most likely to die from the disaster and the least likely to recover without assistance. Yet often, governments at all levels and private citizens have discriminated against them and taken advantage of their misfortune. As part of preparedness, governments all levels, and the U.S. Army, should account for and protect these individuals during planning, training, and executing stages of disaster response operations.

Information

During natural disasters, all levels of government, the press, and the regular U.S. Army have a responsibility to provide the public with truthful, accurate, and timely information. Therefore, emergency planning must address how to verify and disseminate accurate data as early as possible. Failure to do so, regardless of the reason, leads to panic, a loss of confidence by the public in its leaders, and hinders response efforts. While, this may seem self evident, it has not always happened. Dr. Cline's unqualified assessment that Galveston was immune to hurricanes, the numerous reports denying the dangers of the influenza given by Philadelphia's leadership, and Dr. Cline's criticism of the press for not adequately presenting the dangers of the oncoming flood in 1927 highlight that information failures occur with disturbing regularity. On the other hand, when the press correctly reported the Galveston, San Francisco, and Mississippi, disasters to the country, they were a great asset. Donations provided by a concerned public after learning of the disasters aided the responses greatly.

Recommendations

Just as individuals and governments must be prepared, so too must the regular U.S. Army. The U.S. federal government and regular U.S. Army will always have competing priorities. However, the 1918 Influenza Pandemic demonstrated the terrible consequences of failing to balance these priorities. Therefore, the federal government and the Regular Army must develop the capacity to manage a major international crisis and respond to a major domestic emergency simultaneously. While PHSD-5 directed DOD to abide by the NRF and NIMS when providing Defense Support to Civil Authorities (DSCA) following major domestic disasters, these documents are not incorporated into

training or officer development until officers attend the Command and General Staff College, usually between the service member's tenth and thirteenth year of service. Even then, the study is minimal. As a result, senior officers are unprepared for the possibility of executing DSCA-related missions.

For example, on 10 March 2009, 11 civilians were killed during a shooting spree in Samson, Alabama. Soldiers from nearby Fort Rucker responded to a request for assistance from the overwhelmed local law enforcement agencies by conducting traffic control and guarding victims' bodies in a makeshift morgue. While the officer who deployed the Soldiers clearly had good intentions, an internal Army investigation (AR 15-6) concluded employment of Soldiers in this manner violated Posse Comitatus. Although PCA is a long-standing statute, this relatively senior leader did not properly understand it. This incident indicates the U.S. Army is systemically not adequately preparing its leaders to conduct DSCA operations and it should reevaluate its school curriculums and officer development programs.⁴

During every crisis, leadership significantly influences how well or poorly the situation is resolved. Chief Sullivan, Chief Dougherty, MG Greely, and BG Funston all demonstrated the positive impact good leaders could make throughout the San Francisco Fire in 1906. Yet leaders are products of their education and training. The Army should expect to support civil authorities following major natural disasters again in the future. As a learning organization, it should therefore assess how well prepared it is to fulfill that mission and remedy its shortcomings. For the regular U.S. Army, this requires conducting contingency planning down to the unit level, building capacity, and most

importantly, developing leaders, from the time they enter the service, to manage the myriad of legal and civil challenges associated with responding to major natural disasters.

¹Russel L. Honoré, *Survival* (New York: Atria, 2009), 229.

²*Ibid.*, 225.

³*Ibid.*

⁴The Associated Press, “Review: Soldiers Broke Law in Shooting Response,” *Army Times*, 20 October 2009, http://www.armytimes.com/news/2009/ap_army_rucker_shootings_response_101909/ (accessed 12 November 2009).

APPENDIX A

THE SCIENCE OF THE SAN FRANCISCO EARTHQUAKE

Plate Tectonics

The earth is divided into three layers. The innermost layer, the core, is composed mainly of nickel and iron. As deep as three thousand kilometers below the surface, it is further divided into a solid inner layer and molten outer layer.¹ With temperatures in the core approaching 3,500 degrees Celsius, the core provides heat to the world and creates the earth's magnetic field. Directly above the core is the largest layer of the earth, the mantle. Although technically solid, the tremendous temperatures rising from the core cause the mantle's material to be very malleable. As the material boils and moves, it produces steam and pressure. This creates convection currents that cause the outer layer of the earth, the crust, to remain in constant motion.²

At less than 30 kilometers thick, the earth's crust is quite small compared to the mantle or the core. Yet upon the crust is where all the earth's living creatures reside. The mountains, the ocean floors, and all the landmasses are part of the crust as well. However, the crust is broken into several pieces, known as plates. Each plate is influenced by the convection currents underneath them and, although not noticed by the inhabitants of the earth, they move slowly along the mantle very similar an iceberg on the ocean.³ While each plate moves independently, its movements in relation to the others create both the earth's outer features and many of its natural disasters.

While the centers of the plates are relatively stable, dramatic geological events occur along the edges. When two plates of the same size hit each other directly, mountain ranges rise. Plates of different sizes crashing into each other create violent volcanoes. As

plates pull away from each other in the ocean, lava rises from the sea floor and volcanic islands emerge. Finally, when two plates slide along each other moving in opposite directions, much like a southbound commuter train passes a northbound train on a parallel track, earthquakes, result.

The crust is composed of up to thirty-six major plates. The North American Plate dominates much of America, Canada, Alaska, Greenland, and Central America. Its western edge is where North America meets the Pacific Ocean. There it meets several plates. Many of them, such as the Cocos Plate in Central America, the Rivera Plate in Mexico, and the Juan de Fuca Plate in the northwest U.S. are much smaller.⁴ In the general vicinity of California, it also meets the immense Pacific Plate, the only major plate that does not have an associated large land mass. Where two plates meet is termed a fault. The North America and Pacific plates meet along a 750-mile long fault named after Saint Andrew by the Spanish explorers who first settled the area, *San Andreas*.⁵ Movements along the San Andreas Fault caused the 1906 San Francisco in 1906. These same movements may possibly someday destroy the entire city.

The San Andres Fault

While the location of San Andres Fault makes Western California prone to earthquakes, this is not the entire story. The exact location where two plates meet is more of a zone or an area than a line. The zone of the San Andres Fault is usually at least a hundred meters wide and in some locations, more than a kilometer.

The fault runs generally north to south along the western coast of the U.S. A very small plate, the Juan de Fuca Plate, marks the northern boundary and another equally small plate, the Rivera Plate does the same in the south. The massive North American

and Pacific plates push the smaller ones deeper and deeper into the earth in a process known as subduction. Consistent with subduction are volcanoes. To the north is a series of volcanoes, including Mount Saint Helens, known the Cascadia Subduction Zone. The Rivera Plate hosts its own volcanoes in Mexico, namely Colima and Paricutin. While eventually the small plates will cease to exist due to subduction, this will not occur for millions of year. Right now, they have an enormous influence on the fault.

While the North American Plate is relatively stable, the Pacific Plate is moving to the north at inch and a half per year. That may not sound like much, but according geologists, this is an astounding rate. Thus, the Pacific Plate tries to encroach on the Juan de Fuca Plate and separate from the Rivera Plate all the while sliding along the North American Plate. Yet, the two small plates anchor the north and the south of the fault, preventing the Pacific Plate from moving. Over time, tremendous pressures build up, and eventually something, somewhere deep in the earth gives way to the pressure. The stored up energy is released violently as the Pacific plate pushes away from its southern anchor and pushes into its northern one. This is why California earthquakes occur with such regularity and with such force. When the stored energy is full expended, the earthquake stops and the process begins again.⁶

The Earthquake

The term epicenter is often confused. Contrary to a layman's opinion, an earthquake's epicenter is not the same as the area of maximum displacement or damage seen on the ground. The epicenter is actually the earthquake's originating point, the location where seismic energy begins radiating out from the earth. The area of maximum disaster and the epicenter are usually not the same. Many variables, such as the location

of population centers, the soil, the water content of the ground, and the quality of construction, influence where the area of maximum destruction is.

Earthquakes emit three waves. The first wave is the pressure wave, or P-wave. It is the fastest wave and the earliest recorded. It is followed by the slower moving shear wave or S-wave. Both these waves occur deep within the rocks of the earth. The final wave is the surface wave. The surface wave is the most observable wave. It occurs on the surface, is the slowest, and most destructive. When onlookers describe the ground rising and falling in front of them much like a wave on the ocean, they are describing the surface wave.

For an earthquake to occur at least three measuring stations anywhere in the world resourced with a seismograph must observe and record the seismographic activity. The three waves an earthquake emits move at a constant rate, therefore the time difference recorded by a receiving station between the waves tells scientists how far that specific station is from the epicenter. The waves also move directionally 360 degrees. Thus, three stations that record an event can triangulate the epicenter's location. On 18 April 1906 at approximately 5:06 a.m., ninety-six stations across the world recorded an event.

The epicenter was a mile southwest of San Francisco in the Pacific Ocean. There the western coast of the United States moves slightly easterly. As a result, the San Andres fault, which is mostly landlocked, finds itself beneath the San Francisco Bay.⁷ The earthquake was huge. It measured as high as 8.25 on the Richter scale and was felt as far north as Coquille, Oregon, almost 400 miles away. Tremors were also felt as far south as Los Angeles, again close to 400 miles from the epicenter. Winnemucca, Nevada, 340 miles away marks the furthest recorded easterly tremors.⁸

¹Sciencedaily.com, Surprisingly Rapid Changes in the Earth's Core Discovered, <http://www.sciencedaily.com/releases/2008/06/080619102553.htm> (accessed 22 September 2009).

²Simon Winchester, *A Crack in the Edge of the World* (New York: Harper-Collins Publishers, 2005), 48-54.

³Ibid., 58.

⁴Ibid., 60-62

⁵Ibid., 163-165

⁶Ibid., 165-171.

⁷Ibid., 171-179.

⁸Floyd J. Davis, "Soldiers Amidst Rubble: The United States Army and the San Francisco Earthquake of 1906" (Master's Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, 1980), 32.

APPENDIX B

THE SCIENCE OF THE 1918 INFLUENZA PANDEMIC

The Science of Viruses

There are three types of viruses, A, B, and C. Type C viruses do not affect humans. Type B viruses can infect humans, but do not cause local outbreaks, known as epidemics, or worldwide outbreaks, called pandemics. Only Type A viruses have that potential. Additionally, some influenza viruses are endemic; they are constantly around and usually minor. When most people talk about “having the flu,” this is what they are referring to. Yet despite being relatively minor, even these influenza kills up to 36,000 U.S. citizens a year. While that seems like a lot, most victims have weakened immune systems and represent less than one percent of all those who are infected annually.

Influenza viruses evolve slightly from year to year, but remain generally the same. The immune system recognizes the characteristics the “new” strain has with its predecessor, and launches antibodies that destroy the virus. Every now and then however, a mutation occurs that is so significant the immune system does not recognize it. This allows the virus to survive. If it can reproduce in humans and spread easily, an epidemic or pandemic may emerge.¹

An influenza virus is a relatively inert collection of chemicals and proteins. It is a very simple organism, far simpler than even the one-celled bacteria. Because of its simplicity, scientists cannot agree whether or not it could be considered a living organism. A virus’ only ability is to reproduce and even to accomplish this it must rely on cells from other organisms. Nonetheless, influenza viruses are well designed for the task and extremely efficient at it.²

Shaped like the head of a flower, an influenza virus is 1/10,000 millimeter in size. Inside its “head” is the genome, a collection of eight genes that determine what kind of virus it is and how virulent it will become. Bulging out from the surface of the virus are two different types of proteins, hemagglutinin and neuraminidase.³ When the influenza virus attacks a healthy cell in its victim’s respiratory system, the hemagglutinin binds with the healthy cell’s sialic acid, a coating surrounding the cell. Once this is accomplished, the cell is doomed. Most other viruses merge with the cell. Influenza viruses, on the other hand, enter the cell pure where they can hide from the immune system and then essentially conduct a violent takeover. The genes from the virus enter the cell’s nucleus, rewrite the genetic makeup, and begin producing viral proteins that combine into mostly identical copies of the virus. Simultaneously, the neuraminidase dissolves the sialic acid around the dying cell. Otherwise, the new viruses would be trapped when they try to emerge. Within ten hours, the virus creates between 100,000 and a million copies of itself. Ultimately, the doomed cell ruptures and the new viruses, not encumbered by the sialic acid, escape to attack additional healthy cells.⁴

In its most pure form, an influenza virus cannot reproduce in humans. Its natural home is in aquatic birds. Large exposure to avian flu may infect an individual human, but the virus cannot be passed on to others. That is unless the virus mutates. Complex organisms have numerous internal mechanisms to prevent mutation. In simpler organisms, fewer mechanisms exist. Thus, a bacteria cell is more likely to experience a mutation than a mammal and viruses are more likely than bacteria. Additionally, unlike most other viruses, the genes of influenza viruses are not located in Deoxyribonucleic Acid (DNA). Like the viruses that cause Acquired Immune Deficiency Syndrome or

Severe Acute Respiratory Syndrome, the 1918 Influenza virus does not have DNA. Its genes are in a far less stable molecule known as Ribonucleic Acid (RNA). Thus, an influenza virus has virtually no mechanisms to prevent mutation. It is perhaps a million times more likely to mutate than a DNA virus, which is already extremely likely to experience mutation compared to most other organisms.⁵

Therefore, when up to a million copies of a virus escape a ruptured cell, many of them are mutations. Most mutations are too defective to function and quickly die. However, some mutated viruses actually have an advantage. They may be impervious to the immune systems' antibodies, or in the case of influenza, what usually happens is the virus is able to infect other mammals, often pigs. Swine and humans have physically similar immune and respiratory systems. Once in pigs, the process of infection, reproduction, and mutation continues. Occasionally, a new, mutated influenza virus that is able to infect and reproduce in humans emerges. Thus, the simplicity of an influenza virus combined with its ability to quickly reproduce on a massive scale is what makes it so dangerous.⁶

The 1918 Influenza Virus

There are 16 different shapes of Hemagglutinin and neuraminidase has nine. Virologists categorize each shape with a specific number. Thus, when they identify a virus, it is named according to the shape of its protuberances.⁷ Dr. Jeffery Taubenberger identified the virus that caused the influenza virus in 1997 as an "H1N1" virus. Its hemagglutinin had the first form as did the neuraminidase. While there have been other H1N1 strains since 1918, this particular virus was unique in several ways.

First, it disproportionately killed young adults. If the average ages of victims from most flu epidemics were charted, the mortality rates would spike among the very young and very old.⁸ The 1918 influenza virus did that. However, it had a third spike as well. Perhaps fifty percent of the influenza's victims were between 20 and 40 years old.⁹

Generally, those in the prime of their lives have strong immune systems capable of mounting a vigorous defense against disease. Sometimes the defense is so strong that the immune system overreacts and kills virtually every cell in the respiratory system. The lungs quickly fill with fluids leaving the victim unable to breath. In clinical terms, this condition is referred to as Acute Respiratory Distress Syndrome (ARDS) and in 1918, it was always fatal. ARDS killed in a variety of ways. Organs, not receiving enough blood, shut down, lungs filled with so much fluid that the victim drowned, or the strain on the heart caused it to fail. Some victims simply died of exhaustion.

ARDS does not account for all of the deaths from the 1918 Influenza however. About 50 percent of the victims lingered for weeks before dying from secondary diseases because the immune system, greatly weakened after waging a vigorous war against the influenza, was unable to defeat lesser infections or bacteria. Nonetheless, ARDS accounts for most of the victims aged 20 to 40 and the victims who died very quickly. ARDS victims died within days and sometimes within hours of noticing symptoms. Physicians and nurses would report of patients or colleagues who would be working in the morning and dead by evening.¹⁰

ARDS explains the second unusual aspect of the 1918 influenza, its symptoms. Victims' lips, nose, and extremities would turn blue, they would be unable to breath, their lungs would fill with mucus and blood, and the blood and mucus would ooze from their

mouths, ears, eyes, and noses. These ghoulish symptoms were not commonly associated with the flu. As a result, physicians initially were uncertain with what they were dealing with. Many who lingered for weeks appeared to die from pneumonia, which was often an accurate diagnosis, as discussed above. This led to the common misdiagnosis that the pandemic was caused by a bacterium that causes pneumonia.¹¹

The final unusual aspect of the 1918 H1N1 influenza was its virulence, its death rate and the speed in which it killed. In a usual flu virus, approximately a quarter of one percent of those infected actually die. However, during 1918 influenza, some estimates suggest that between eight and ten percent of those infected would succumb. This makes the 1918 influenza virus approximately 25 times more deadly than a normal influenza strain.¹² Why and how the 1918 influenza virus was so virulent remains a mystery. Scientists generally agree the answer lies somewhere in its genetic makeup, its genome. Beyond that, they do not know.¹³ Somehow, it mutated at least twice during the pandemic from 1918 into 1919. This accounts for the three distinct waves of the disease. The first, which struck in the spring of 1918, had a higher mortality rate than a standard endemic flu, but statistically not by much and physicians did not consider it a significant threat. Yet the first mutation led to a second, far more virulent wave that exploded seemingly overnight ravaging the world. The third wave, in late 1918 into 1919, was similar in virulence to the first wave.¹⁴

¹Victoria Gill, "The Mother of All Flu Pandemics," *BBC News*, 19 April 2009, <http://news.bbc.co.uk/2/hi/science/nature/8024718.stm> (accessed 17 June 2009).

²John M. Barry, *The Great Influenza: The Epic Story of the Deadliest Plague in History* (New York: Penguin Group, 2005), 98-104.

³Gill.

⁴Barry, 98-104.

⁵Ibid., 105-106.

⁶Ibid., 107-115.

⁷Gill.

⁸Douglas Almond and Bhashkar Mazumder, "The 1918 Influenza Pandemic and Subsequent Health Outcomes," *American Economic Review* (May 2005): 258-262.

⁹Gina Kolata, *Flu* (New York: Farrar, Straus, and Giroux, 1999), 4-8.

¹⁰Barry, 250-252.

¹¹Gill.

¹²Ibid.

¹³Leonard Crane, "An Interview with Dr. Jeffery Taubenberger, M.D., Ph.D.," *Ninethday.com*, May 1998, <http://www.ninethday.com/tauben.htm> (accessed 29 October 2009).

¹⁴Kolata, 305.

APPENDIX C

CURRENT DOCTRINE, POLICY, AND STATUTES

The Posse Comitatus Act, Commander's Emergency Authority, Immediate Action Authority, and the Insurrection Act

The PCA states: "Whoever, except in cases and under circumstances expressly authorized by the Constitution or Act of Congress, willfully uses any part of the Army or the Air Force as a posse comitatus or otherwise to execute the laws shall be fined under this title or imprisoned not more than two years, or both." (18 United States Code § 1385).

During Reconstruction, the U.S. Army performed several law enforcement functions in the former Confederate States to include responding to civil disturbances, quelling riots, conducting investigations, and making apprehensions.¹ In accordance with the Hayes-Tilden compromise following the presidential election in 1876, federal troops withdrew from the southern states and in 1878 Congress passed the PCA to ensure they did not return. The act forbids any person from willfully using any part of the Army to conduct law enforcement operations within the U.S. unless authorized beforehand by Congress or the Constitution.² Although the statute does not specifically mention the Navy or Marines, DOD policy forbids the use of those personnel as well. Additionally, the PCA does not apply to the National Guard, unless the President has ordered those Soldiers into federal service. The Coast Guard is also exempt from the PCA.³

While the act has remained relatively unchanged over the past 130 years, numerous exemptions exist. Active Duty Soldiers may conduct law enforcement functions in order to protect federal property or assets such as military installations or

U.S. Government buildings.⁴ Additionally, federal soldiers may conduct law enforcement when responding to chemical, biological, radiological, nuclear, and high yield explosive incidents. Another exemption is *Commander's Emergency Authority*, which authorizes a local U.S. Army commander to take immediate action when a sudden and unexpected civil disturbance occurs in order to save lives, preserve government functions, and maintain public order. Local leaders do not need to request assistance beforehand and the commander may use his forces to conduct law enforcement as needed. However, the situation must pose significant risk to life, property, or governmental process, be beyond the capacity of local authorities, and be of such urgency that it is implausible to receive presidential authorization prior. Additionally as soon as the immediate crisis passes, the Army must cease operations.⁵

Commander's Emergency Authority is not be confused with *Immediate Action Authority*, which grants Army installation commanders the ability to respond quickly to local disasters within the continental U.S. or its territories before a declared emergency or disaster. However, local civilian leaders must first request the assistance, the actions Soldiers take must specifically target saving lives or protecting property, and the assistance must adhere to the limitations of the PCA.⁶

Another pertinent exemption to the PCA is the *Insurrection Act* (10 United States Code § 331-334). As the title suggests, the purpose of the law is to defeat domestic threats from insurrection posed by either individuals or groups. This statute allows the President to use regular Army forces to conduct law enforcement activities under one of four conditions: the state government requests assistance, the situation has made the enforcement of laws within a state impractical, "insurrection, domestic violence,

unlawful combination, or conspiracy” exists within a state and the state government is either unable or unwilling to suppress it, or the state is obstructing justice or the execution of the law. The act mandates that the President must first order the insurgents to disperse before employing military forces and this act does not allow the President to utilize regular Army Soldiers in response to natural disasters.⁷

The Stafford Act

Also known as the Disaster Mitigation Act, The Robert T. Stafford Act authorizes the president to allocate federal resources, including Title 10 Soldiers, to states in response to natural disasters. It also defines the requirements for presidential declarations of emergency or major disaster and Congress’ role regarding oversight.

However, a rigid series of events must occur beforehand. First, the local government must activate its emergency response plan and attempt to control the emergency locally. Through previously established agreements with surrounding municipalities, the impacted government will ask neighboring communities for assistance. If the incident remains beyond their resources and capabilities of the local government, must then request assistance from the state. The state will then allocate its own own resources to assist the affected local government and again utilize mutual agreements with other states to acquire further resources and capabilities. If the state’s resources and capabilities prove overwhelmed as well, the governor must formally request federal support from the president and specifically highlight the capability gaps the state requires the federal government to address. While this statute allows regular Army soldiers to perform numerous tasks in support of local municipalities, based off

approval from the Secretary of Defense, it does not exempt the regular Army from the provisions of the PCA.⁸

Homeland Security Act

In response to the terrorist attacks on 11 September 2001, the 107th Congress passed the Homeland Security Act (Public Law 107-296) into law on 25 November 2002. While the primary purpose of the act is to protect America from terrorist attacks within the U.S., several aspects of the statute are pertinent regarding natural disaster response. The law charged the DHS as the lead agency regarding national emergency prevention, preparedness, response, and recovery operations to include major natural disasters. Additionally, it placed the Coast Guard and FEMA under the control of DHS. This act is significant to the Army for two reasons. One, the DOD is not the doctrinal authority regarding natural disaster response. Army leaders must be familiar with the policies and procedures found in the NIMS and NRF, both of which DHS oversees. Secondly, conducting response operations following a major natural disaster, the U.S. Army is not under the preview of the DOD, but rather in support of DHS.⁹

Current Disaster Response Policy

On 28 February 2003, President George W. Bush signed Presidential Homeland Security Directive Number 5 (HSPD #5), *Management of Domestic Incidents*. In accordance with that directive, the DHS established the NRF and the NIMS as the two primary doctrinal documents regarding national response to emergencies, including natural disasters. These documents establish a consistent, unified, and holistic national approach to natural disaster preparedness, response, and mitigation. They are applicable

at the local, tribal, state, and federal levels of government and comply with the legal statutes discussed above.¹⁰ The ultimate purpose of these documents is to save lives, reduce property damage, and protect the environment. Active Army Leaders must be familiar with these documents and their Soldiers trained on their procedures because this is how all other stakeholders responding to a natural disaster will operate and how DOD will be expected to operate.

Nation Incident Management System

The DHS originally published the document on 1 March 2004, and revised it 2008. In the NIMS, the DHS adopted the best practices from throughout the country into a unified national framework that ensures all stakeholders can work together to prepare for, prevent (if possible), respond to, and mitigate the effects of the full spectrum of incidents, from a small local traffic jam or building fire, to a major natural disaster. Essential to ensuring effective and well-integrated response is interoperability and compatibility among all stakeholders, to include local, tribal, state, and federal responders as well as NGOs such as the Red Cross. Therefore, the NIMS established a standard template that is flexible enough to be applicable to all incidents, regardless of size or whether the cause was man-made or natural.¹¹

The two general premises of NIMS and national policy are that the lowest level of government possible will retain ultimate authority over response operations and that national resources, especially DOD assets, would not be allocated to support recovery operations unless a catastrophic event has occurred. By understanding these two premises, Army commanders can anticipate the size and structure of the management

organization they would be supporting as well as the magnitude of the response to an incident.

NIMS is comprised of five components: Preparedness, Communications and Information Management, Resource Management, Command and Management, and Ongoing Management and Maintenance. The first four components are most relevant to the U.S. Army when supporting recovery operations.

Preparedness, discusses the measures and capabilities all stakeholders should develop and incorporate into their contingency plans. Additionally, all agencies should enhance preparedness through planning, organizing, training, equipping, and exercising their systems. Essential to preparedness is critical self-evaluation followed by corrective action.¹²

The second component of NIMS is Communications and Information Management. Soldiers supporting response operations must understand that the communications system and terminology is designed for incident commanders, their staffs, and all additional stakeholders to achieve situational awareness and a common operating picture. Therefore, communication and information systems must be interoperable and compatible among all agencies, not just DOD assets. A properly planned and resourced communication architecture coupled with clearly defined procedures will enable accurate reporting, dissemination of information, and allocation of resources.¹³

The third component of NIMS is Resource Management. While the size of the incident will influence how resources are acquired and distributed, the purpose of resource management is to ensure the correct resources are in the correct location at the

correct time. Failure to achieve this will result in resources being improperly allocated or underutilized which may lead to mission failure or additional loss of life, suffering, or property damage. Essential to resource management, all stakeholders must follow proper procurement procedures, not over burden the system with inaccurate or excessive requests, and ensure they maintain proper accountability. The underlying concepts of resource management are consistency, standardization, coordination, proper use, information management, and credentialing.¹⁴

The fourth component of NIMS, Command and Management, details the three fundamental elements of incident management, the Incident Command System, Multiagency Coordination System, and Public Information. This component applies consistent terminology and standard organizational structures that can be applied to manage any incident. While it is beyond the scope of this thesis to describe these systems in detail, they are often considerably different from the hierarchical chain of command understood by Army leaders. Therefore, in order to provide effective support as quickly as possible, leaders should thoroughly understand the NIMS command and management structures beforehand.¹⁵

National Response Framework

While NIMS provides the template for the management of incidents, the NRF provides the structure and mechanisms. It is a guide for how the U.S. conducts response operations. Like in the NIMS, the incidents could vary from very small to immense and could be man-made or natural. Therefore, the roles, responsibilities, and coordinating structures outlined in the NRF are designed to apply to any circumstance. It focuses on

how the U.S. government is organized to support communities, municipalities, and states following major disasters.¹⁶

The NRF identifies five key principles integral to response doctrine: engaged partnerships, tiered response, scalable, adaptable, and flexible operational capabilities, unity of effort through unity of command, and readiness.¹⁷ These overarching principles are inherent throughout the NRF's five chapters: Roles and Responsibilities, Response Actions, Response Organization, Planning, and Additional Resources. The first three chapters are most pertinent to active Army leaders and planners. The first, Roles and Responsibilities, discusses the emergency management positions at the local, tribal, state, and federal level and specifies their responsibilities.¹⁸

The second chapter, "Response Actions," discusses the three phases of response: prepare, respond, and recover. Like in the NIMS, the NRF emphasizes preparedness. To be effective during a real-world emergency, all stakeholders must build capacity through planning, organizing and training, exercising, and evaluating prior to the incident. Also like in NIMS, the NRF discusses the importance of situational awareness and deploying the proper resources and capabilities during recover operations.¹⁹

The third chapter, "Response Organization," defines the control nodes from the onsite incident command post to the National Operations Center. It also highlights the role of FEMA and its organization. This chapter is important to Army planners and leaders because it defines Emergency Support Functions (ESF). These are the mechanisms to coordinate critical functional capabilities and resources. In addition, it identifies the lead agency for each ESF. DOD is rarely the primary agency for any ESF; however, it is in support for all of them. Therefore, using this information, commanders

preparing to support recovery operations could identify possible tasks and resources they should focus on.²⁰ Finally, this chapter defines the DOD elements such as the Defense Coordinating Officer and the Defense Coordinating Element and their roles in coordinating DOD requirements with the civilian leaders at all levels of government during recovery operations. Again, this is essential information for Army leaders and planners preparing to support recovery operations.²¹

¹Maximo Moore, “Rescuing DoD From Too Much of a Good Thing: The Wrong Kind of Disaster Response” (Monograph, School of Advanced Military Studies, 2006), 11-14.

²Charles Doyle, *The Posse Comitatus Act and Related Matters: The Use of the Military to Execute Civilian Law* (Washington, DC: Government Printing Office, 2000), 8-9.

³*Ibid.*, 21-23.

⁴*Ibid.*, 19.

⁵Department of the Army, Field Manual (FM) 3-28, *Civil Support Operations* (Washington, DC: Government Printing Office, 2008), paragraph 4-23.

⁶FM 3-28, paragraph 1-28.

⁷Moore, 14-15.

⁸*Ibid.*, 16-18.

⁹*Ibid.*, 18-19.

¹⁰U.S. Department of Homeland Security, *National Incident Management System (NIMS)* (Washington, DC: Government Printing Office, 2008), 3-4.

¹¹*Ibid.*, 1-5.

¹²*Ibid.*, 9.

¹³*Ibid.*, 23.

¹⁴*Ibid.*, 31-40.

¹⁵Ibid., 45.

¹⁶U.S. Department of Homeland Security, *National Response Framework (NRF)* (Washington, DC: Government Printing Office, 2008), 1.

¹⁷Ibid., 9.

¹⁸Ibid., 15.

¹⁹Ibid., 28-32.

²⁰Ibid., 54-59.

²¹Ibid., 68.

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